HUSSMANN®

MagPak™ *Electronic Expansion Valve Driver*

User Manual

May 2017

HUSSMANN CORPORATION • BRIDGETON, MO 63044-2483 U.S.A.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

⚠ CAUTION

This manual was written in accordance with originally prescribed equipment that is subject to change. Hussmann reserves the right to change all or part of the equipment for future stores such as, but not limited to, controllers, valves and electrical specifications. It is the installers responsibility to reference the refrigeration drawings supplied for each installation, as directed by the Engineer of Record.

⚠ WARNING

PERSONAL PROTECTION EQUIPMENT (PPE)

Only qualified personnel should install and service this equipment. Personal Protection Equipment (PPE) is required whenever servicing this equipment. Always wear safety glasses, gloves, protective boots or shoes, long pants, and a long-sleeve shirt when working with this equipment. Observe all precautions on tags, stickers, labels and literature attached to this equipment.

The information provided in this documentation contains general descriptions and/or technical characteristics of the performance of the products contained herein. This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications. It is the duty of any such user or integrator to perform the appropriate and complete risk analysis, evaluation and testing of the products with respect to the relevant specific application or use thereof. Neither Hussmann nor any of its affiliates or subsidiaries shall be responsible or liable for misuse of the information contained herein. If you have any suggestions for improvements or amendments or have found errors in this publication, please notify us.

No part of this document may be reproduced in any form or by any means, electronic or mechanical, including photocopying, without express written permission of Hussmann.

All pertinent state, regional, and local safety regulations must be observed when installing and using this product. For reasons of safety and to help ensure compliance with documented system data, only the manufacturer should perform repairs to components.

When devices are used for applications with technical safety requirements, the relevant instructions must be followed.

Failure to use Hussmann software or approved software with our hardware products may result in injury, harm, or improper operating results.

Failure to observe this information can result in injury or equipment damage.

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ABOUT THE BOOK

How to use this manual

This manual uses the following conventions to highlight certain parts of the text:

	**Note**	Indicates further information on the subject concerned that the user should take into account.
	**Tip**	A suggestion that could help the user to understand and make better use of the information provided
*, **, (*), (**), ([1]), ([2]), (§)		Provides further specifications on an explanation provided previously
Fig. 1, 1 - Fig. 1, etc.		Provides references to figures, details in figures, parts of the text. Figures are referred to using an abbreviation in bold (E.g. "**Fig.**") and a number identifying the reference (E.g. **Fig. 1**). For components inside figures, the references are given using a letter or number (E.g. **1 - Fig. 1**). References to parts of the text are given using the number and title of the relative chapters, sub-chapters, paragraphs and page number.

Document Scope

This document describes the **Hussmann MagPak Electronic Expansion Valve** drivers and accessories including installation and wiring information.

Validity Note

This document is valid for **SoMachine HVAC programming software**.

Related Documents

Title of Document
MagPak Controller Hardware User Guide
Input/Output Module Data Sheet
Energy Meter User Guide

SAFETY INFORMATION

Important Information

Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to inform of potential hazards or to call attention to information that clarifies or simplifies a procedure.

The addition of this symbol to a Danger safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards.
Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, **results in** death or serious injury**.**

⚠WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **can result in** death or serious injury.

⚠CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, **can result in** minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to physical injury.

PLEASE NOTE

Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel.
No responsibility is assumed by Hussmann for any consequences arising out of the use of this material.
A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and its installation, and has received safety training to recognize and avoid the hazards involved.

Permitted use

This product is used to control stepper type unipolar and bipolar electronic expansion valves in MagPak applications.

For safety reasons, the device must be installed and used in accordance with the instructions provided. In particular, parts carrying dangerous voltages must not be accessible under normal conditions.

The device must be adequately protected from water and dust with regard to the application, and must only be accessible using tools (with the exception of the front panel).

The device is also suitable for use in household and commercial refrigeration appliances and/or similar equipment and has been tested for safety aspects in accordance with the harmonized European reference standards.

Prohibited use

Any use other than that expressed above under Permitted use is strictly prohibited.

The relay contacts supplied are of an electromechanical type and subject to wear. Functional safety protection devices, specified in international or local standards, must be installed externally to this device.

Liability and residual risks

Hussmann liability is limited to the proper and professional use of this product under the guidelines contained in the present and other supporting documents, and does not extend to damages caused by (but not limited to):

- Unspecified installation/use and, in particular, in contravention of the safety requirements of established legislation or specified in this document;
- Use on equipment which does not provide adequate protection against electrocution, water and dust in the actual installation conditions;
- Use on equipment in which dangerous components can be accessed without the use of specific tools;
- Installation/use on equipment which does not comply with established legislation and standards.

Disposal

The appliance (or the product) must be disposed of separately in compliance with the local standards in force on waste disposal.

Product Related Information

⚠ ⚠DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices, prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is removed.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

This equipment has been designed to operate outside of any hazardous location.
Only install this equipment in zones known to be free of hazardous atmosphere.

⚠DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.(1)
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS 7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems” or their equivalent governing your particular location.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software approved by Hussmann for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can result in death, serious injury, or equipment damage

1 - INTRODUCTION

1.1 - General description

Hussmann valve driver manages unipolar and bipolar stepping electronic expansion motor valves suited for a range of needs defined by the MagPak packaged system application.

The ability to select refrigerant types and compatibility with most commercially available valves make this solution particularly versatile.

The driver also offers the possibility to configure a refrigerant that is not included in the factory default settings.

The driver ensures a very precise, stable and reliable control of refrigerant flow, consequently increasing efficiency and energy savings by adjusting superheat and valve opening according to the performance demanded by the system and in different working conditions.

The isolated serial connections and backup sensors help assure reliability.

The driver also has a Modbus RTU serial communication standard interface with the option to download parameter maps and applications

All digital inputs and digital outputs are independent and configurable, meaning they can be adapted to fit any system. Power supply is 24VAC / VDC

1.2 - Main functions

The main functions of the **the driver** are as follows:

- refrigerant selected via selectors (DIP switches) under the door
- backup probes control saturation and evaporator output (superheat)
- valve state shown via LEDs
- parameter settings via keyboard or PC
- terminal (up to 100m) that can be connected directly with no serial interface
- configurable inputs NTC, Pt1000, 4...20mA, 0...10V, 0...5V ratiometric
- 2 Digital inputs to control valve and/or alarms.

2 - ACCESSORIES

2.1 - List of compatible valves

The **driver** is compatible with the valves listed below. For use with other valves, contact Hussmann Technical Support.

⚠WARNING

UNINTENDED EQUIPMENT OPERATION

Verify the manufacturer valve parameter information before using your valve with the generic valve type.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Hussmann is not liable for the data provided by the valve manufacturer, including any technical modifications or updates.

Always consult the technical manual of the valve manufacturer, particularly to check the plate data and correct operations.

Reference	Power supply	Notes
SXVB manufactured by CASTEL	24V	Bipolar
Emerson EX5	24V	Bipolar
Emerson EX6	24V	Bipolar
Emerson EX7	24V	Bipolar
Emerson EX8	24V	Bipolar
DANFOSS ETS50	12V	Bipolar
DANFOSS ETS100	12V	Bipolar
CAREL E2V-E3V-E4V-E5V-E6V-E7V	12V	Bipolar
SPORLAN SER(I) G, J, K, B, C, D	12V	Bipolar
SPORLAN SER 1.5 TO 20	12V	Bipolar
SPORLAN SEI-30	12V	Bipolar
SPORLAN SEI-50	12V	Bipolar
SPORLAN SEH	12V	Bipolar reference only
SANHUA DPF(Q)-DPF(T01)	12V	Unipolar
ALCO EXM246-EXL246	12V	Unipolar

Tab. 4 Compatible valves

3 - MECHANICAL INSTALLATION

3.1 - Before Starting

Read and understand this chapter before beginning the installation of your system. The use and application of the information contained herein requires expertise in the design and programming of automated control systems. Only you, the user, machine builder or integrator, can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safeties and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, you must also consider any applicable local, regional or national standards and/or regulations. Pay particular attention in conforming to any safety information, different electrical requirements, and normative standards that would apply to your machine or process in the use of this equipment.

⚠ WARNING

REGULATORY INCOMPATIBILITY

Be sure that all equipment applied and systems designed comply with all applicable local, regional and national regulations and standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.2 - Disconnecting Power

All options and modules should be assembled and installed before installing the control system on a mounting rail, into a panel door or onto a mounting surface. Remove the control system from its mounting rail, mounting plate or panel before disassembling the equipment

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices, prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is removed.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

3.3 - Operating Environment

This equipment has been designed to operate outside of any hazardous location. Only install this equipment in zones known to be free of a hazardous atmosphere

⚠ DANGER

POTENTIAL FOR EXPLOSION

Install and use this equipment in non-hazardous locations only.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Install and operate this equipment according to the conditions described in this General Specifications.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.4 - Installation Considerations

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use appropriate safety interlocks where personnel and/or equipment hazards exist.
- Install and operate this equipment in an enclosure, or other locations that are appropriate for its rated environment.
- Power line and output circuits must be wired and fused in compliance with local and national regulatory requirements for the rated current and voltage of the particular equipment.
- Do not use this equipment in safety-critical machine functions.
- Do not disassemble, repair, or modify this equipment.
- Do not connect any wiring to reserved, unused connections, or to connections designated as Not Connected (N.C.).
- Do not mount devices in extremely damp and/or dirt-laden areas

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE: JDYX2 or JDYX8 fuse types are UL-recognized and CSA approved.

For mechanical dimensions, see **“3.8 - Mechanical dimensions”**.

The driver is intended for DIN rail mounting.

Care must be taken to avoid damage from electrostatic sources when handling this equipment. In particular exposed connectors and, in some cases, exposed printed circuit boards are exceptionally vulnerable to electrostatic discharge.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION DUE TO ELECTROSTATIC DISCHARGE DAMAGE

- Keep equipment in the protective conductive packaging until you are ready to install the equipment.
- Only install equipment in approved enclosures and / or locations that prevent casual access and provide electrostatic discharge protection as defined by IEC 1000-4-2.
- Use a conductive wrist strap or equivalent field force protective device attached to an earth ground when handling sensitive equipment.
- Always discharge yourself by touching a grounded surface or approved antistatic mat before handling the equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.5 - Installation of generic valve type

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Verify the manufacturer valve parameter information before using your valve with the generic valve type.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

3.6 - Driver installation

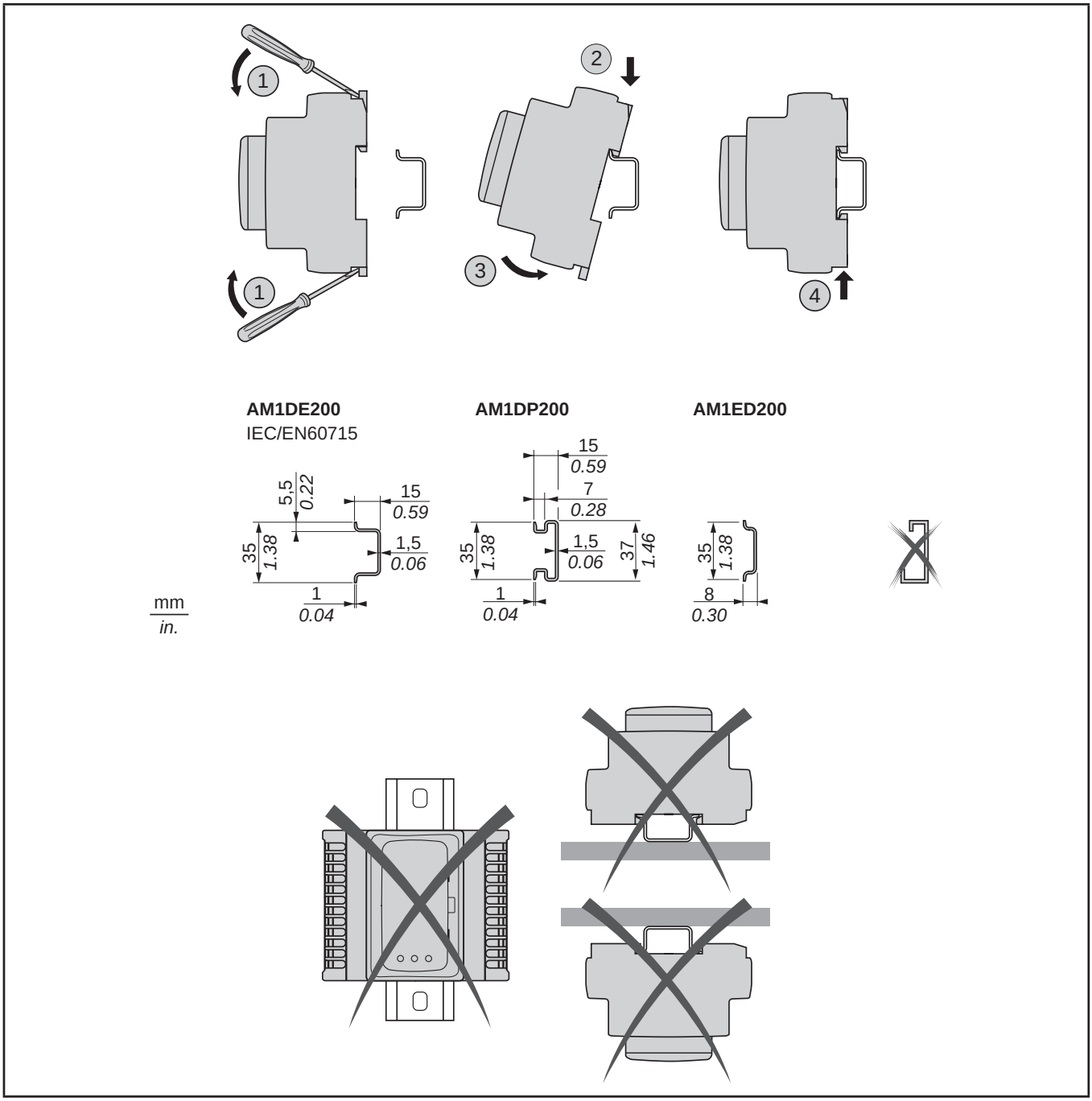
The ambient temperature range for correct operation is between –5 and 55 °C, 90% R.H. (non condensing).

Do not mount the device in extremely damp or dirt-laden areas; it is designed for use in places with ordinary or normal levels of pollution. Keep the area around the device cooling slots adequately ventilated.

The TTL serial connector is located on the upper part of the front cover and is inserted vertically. The instrument is intended for DIN rail mounting.

Referring to **Fig. 1**, for installation on the DIN rail proceed as follows,

1. move the two “spring docking devices” to their standby position (use a screwdriver to press against the relative compartments);
2. install the device on the DIN rail, pressing on the “spring docking devices” with your fingers to put them into the locked position.



The drivers has been designed as an IP20 product and must be installed in an enclosure. Clearances must be respected when installing the product.
There are 3 types of clearances between:

- The drivers and all sides of the cabinet (including the panel door).
- The drivers terminal blocks and the wiring ducts.
  This distance reduces electromagnetic interference between the controller and the wiring ducts.
- The drivers and other heat generating devices installed in the same cabinet.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Place devices dissipating the most heat at the top of the cabinet and ensure adequate ventilation.
- Avoid placing this equipment next to or above devices that might cause overheating.
- Install the equipment in a location providing the minimum clearances from all adjacent structures and equipment as directed in this document.
- Install all equipment in accordance with the specifications in the related documentation.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

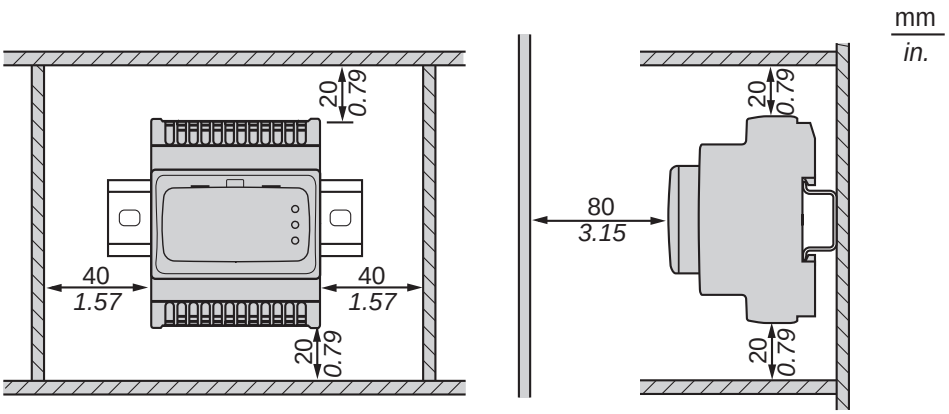


Fig. 2 Clearances

3.6.1 - Access to DIP switches

Care must be taken to avoid damage from electrostatic sources when handling this equipment. In particular exposed connectors and, in some cases, exposed printed circuit boards are exceptionally vulnerable to electrostatic discharge.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION DUE TO ELECTROSTATIC DISCHARGE DAMAGE

- Keep equipment in the protective conductive packaging until you are ready to install the equipment.
- Only install equipment in approved enclosures and / or locations that prevent casual access and provide electrostatic discharge protection as defined by IEC 1000-4-2.
- Use a conductive wrist strap or equivalent field force protective device attached to an earth ground when handling sensitive equipment.
- Always discharge yourself by touching a grounded surface or approved antistatic mat before handling the equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Referring to **Fig. 3**, for access to the DIP switches proceed as follows:

1. if necessary, use a straight-edge screwdriver or the nail of your index finger to open the door;
2. carefully configure the selectors (DIP switches)
3. if necessary, close the front of the keyboard by pressing with your fingers.

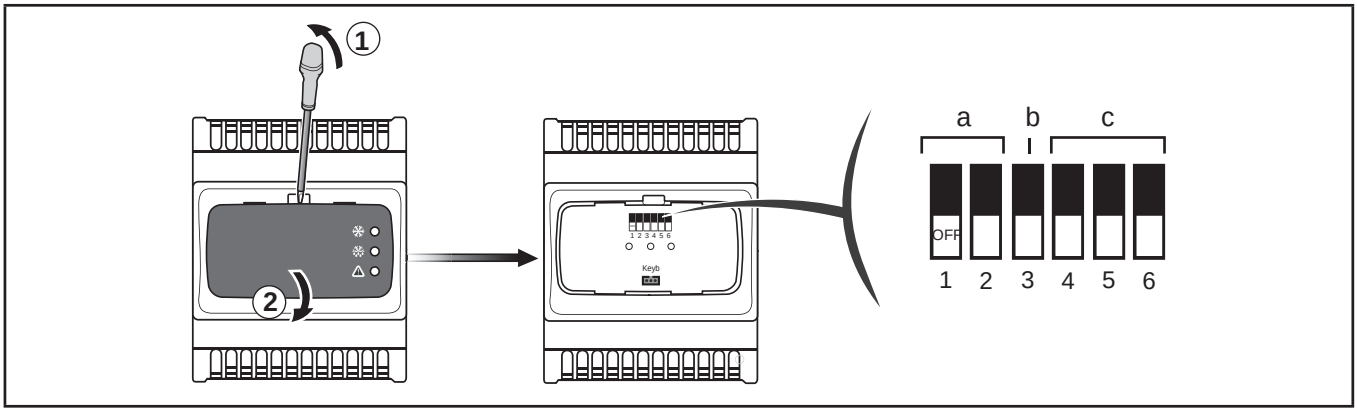


Fig. 3 Access to DIP switches

3.7 - Mechanical dimensions

	Length (L) mm	Depth (d) mm	Height (H) mm	Notes
Driver front panel (box)	70	-	45	(+0.2 mm)
Driver measurements	70.2	61.6 56.4 from Din bar to cover	87	4DIN

Tab. 5 Mechanical dimensions

4 - ELECTRICAL CONNECTIONS

4.1 - Wiring Best Practices

The following information describes the wiring guidelines and associated best practices to be respected when using th**e valve** drivers.

⚠ ⚠ DANGER

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH

- Disconnect all power from all equipment including connected devices, prior to removing any covers or doors, or installing or removing any accessories, hardware, cables, or wires.
- Always use a properly rated voltage sensing device to confirm the power is removed.
- Replace and secure all covers, accessories, hardware, cables, and wires and confirm that a proper ground connection exists before applying power to the unit.
- Use only the specified voltage when operating this equipment and any associated products.

Failure to follow these instructions will result in death or serious injury.

⚠ WARNING

LOSS OF CONTROL

- The designer of any control scheme must consider the potential failure modes of control paths and, for certain critical control functions, provide a means to achieve a safe state during and after a path failure. Examples of critical control functions are emergency stop and overtravel stop, power outage and restart.
- Separate or redundant control paths must be provided for critical control functions.
- System control paths may include communication links. Consideration must be given to the implications of unanticipated transmission delays or failures of the link.
- Observe all accident prevention regulations and local safety guidelines.(1)
- Each implementation of this equipment must be individually and thoroughly tested for proper operation before being placed into service.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) For additional information, refer to NEMA ICS 1.1 (latest edition), “Safety Guidelines for the Application, Installation, and Maintenance of Solid State Control” and to NEMA ICS 7.1 (latest edition), “Safety Standards for Construction and Guide for Selection, Installation and Operation of Adjustable-Speed Drive Systems” or their equivalent governing your particular location.

4.1.1 - Wiring Guidelines

The following rules must be applied when wiring **the valve** drivers:

- I/O and communication wiring must be kept separate from the power wiring. Route these two types of wiring in separate cable ducting.
- Verify that the operating conditions and environment are within the specification values.
- Use proper wire sizes to meet voltage and current requirements.
- Use copper conductors (required).
- Use twisted pair, shielded cables for analog, and/or fast I/O.
- Use twisted pair, shielded cables for networks, and fieldbus.

Use shielded, properly grounded cables for all analog and high-speed inputs or outputs and communication connections. If you do not use shielded cable for these connections, electromagnetic interference can cause signal degradation. Degraded signals can cause the controller or attached modules and equipment to perform in an unintended manner.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Use shielded cables for all fast I/O, analog I/O and communication signals.
- Ground cable shields for all analog I/O, fast I/O and communication signals at a single point (1).
- Route communication and I/O cables separately from power cables.
- Make connections as short as possible and do not wind them around electrically connected parts.

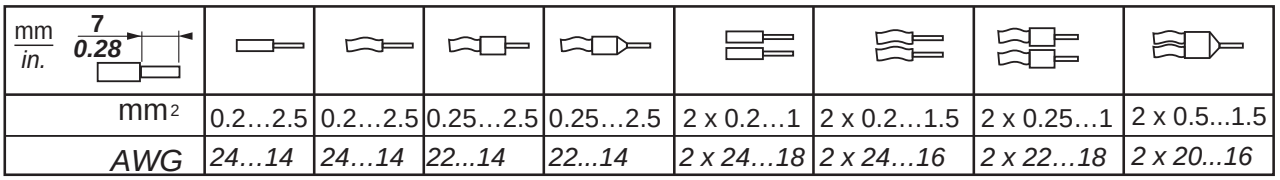
Failure to follow these instructions can result in death, serious injury, or equipment damage.

(1) Multipoint grounding is permissible if connections are made to an equipotential ground plane dimensioned to help avoid cable shield damage in the event of power system short-circuit currents.

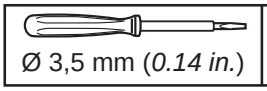
NOTE: Surface temperatures may exceed 60 °C. Route primary wiring (wires connected to power mains) separately and apart from secondary wiring (extra low voltage wiring coming from intervening power sources). If that is not possible, double insulation is required such as conduit or cable gains.

4.1.2 - Rules for Removable Screw Terminal Block

The following table presents the cable types and wire sizes for a **5.08** or **5.00 pitch** removable screw terminal block:



mm²	0.2…2.5	0.2…2.5	0.25…2.5	0.25…2.5	2 x 0.2…1	2 x 0.2…1.5	2 x 0.25…1	2 x 0.5...1.5
AWG	*24…14*	*24…14*	*22...14*	*22...14*	*2 x 24…18*	*2 x 24…16*	*2 x 22…18*	*2 x 20...16*



N•m	0.5...0.6
lb-in	*4.42...5.31*

Fig. 5 Pitch 5.08 mm (0.20 in.) or 5.00 mm (0.197 in.)

The use of copper conductors is required.

⚠ ⚠ DANGER

LOOSE WIRING CAUSES ELECTRIC SHOCK

- Tighten connections in conformance with the torque specifications.
- Do not insert more than one wire per connector of the terminal block without the cable ends specified in the tables found in the Rules for Removable Screw Terminal Block information.

Failure to follow these instructions will result in death or serious injury.

⚠ DANGER

FIRE HAZARD

- Use only the recommended wire sizes for the current capacity of the I/O channels and power supplies.
- For relay output wiring of 5 A, use conductors of at least 2.0 mm^2 (AWG 12) with a temperature rating of at least 80 °C (176 °F).

Failure to follow these instructions will result in death or serious injury.

4.1.3 - Protecting Outputs from Inductive Load Damage

Depending on the load, a protection circuit may be needed for the outputs on the controllers and certain modules. Inductive loads using DC voltages may create voltage reflections resulting in overshoot that will damage or shorten the life of output devices.

⚠ CAUTION

OUTPUT CIRCUIT DAMAGE DUE TO INDUCTIVE LOADS

Use an appropriate external protective circuit or device to reduce the risk od inductive direct current load damage.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

If your controller or module contains relay outputs, these types of outputs can support up to 240 Vac. Inductive damage to these types of outputs can result in welded contacts and loss of control. Each inductive load must include a protection device such as a peak limiter, RC circuit or flyback diode. Capacitive loads are not supported by these relays.

⚠ WARNING

RELAY OUTPUTS WELDED CLOSED

- Always protect relay outputs from inductive alternating current load damage using an appropriate external protective circuit or device.
- Do not connect relay outputs to capacitive loads.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Protective circuit A: this protection circuit can be used for both AC and DC load power circuits.

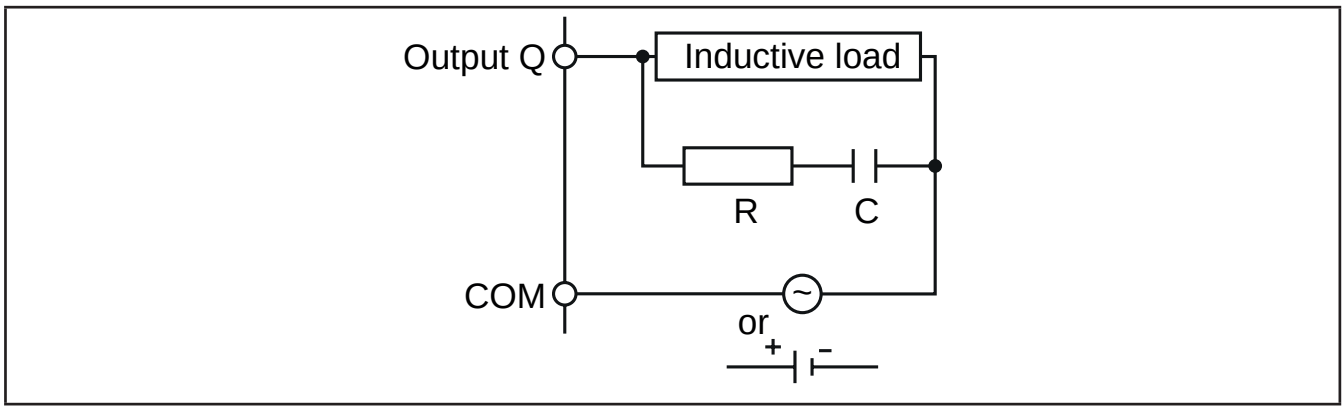


Fig. 6 Protective circuit A

C Value from 0.1 to 1 µF

R Resistor of approximately the same resistance value as the load

Protective circuit B: this protection circuit can be used for DC load power circuits.

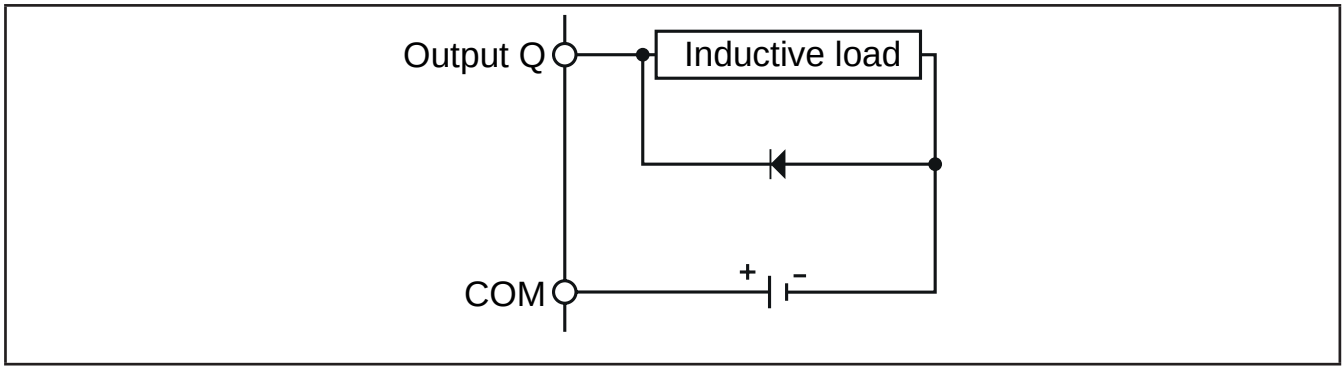


Fig. 7 Protective circuit B

Use a diode with the following ratings:

- Reverse withstand voltage: power voltage of the load circuit x 10.
- Forward current: more than the load current.

Protective circuit C: this protection circuit can be used for both AC and DC load power circuits.

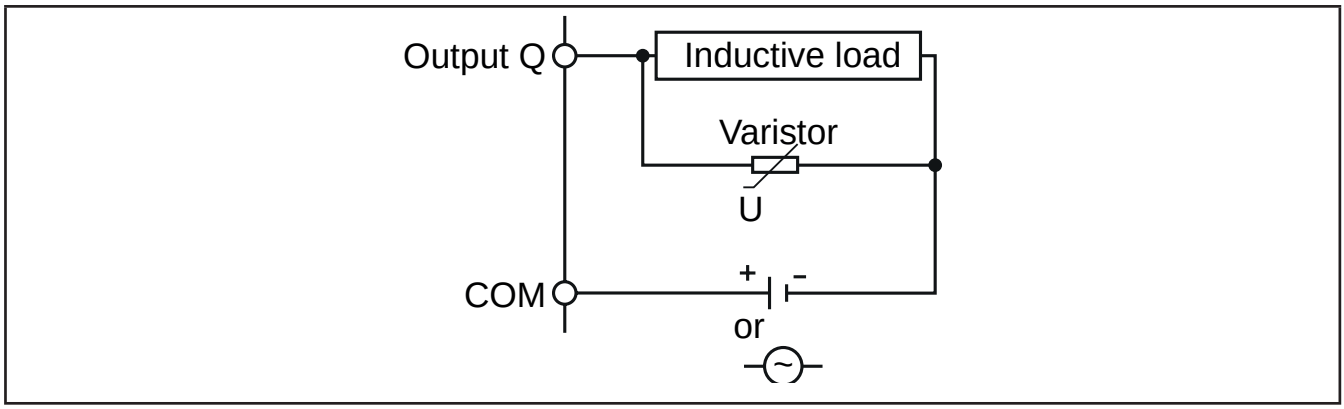


Fig. 8 Protective circuit C

In applications where the inductive load is switched on and off frequently and/or rapidly, ensure that the continuous energy rating (J) of the varistor exceeds the peak load energy by 20 % or more.

NOTE: Place protection devices as close to the load as possible.

4.1.4 - Special handling considerations

Care must be taken to avoid damage from electrostatic sources when handling this equipment. In particular exposed connectors and, in some cases, exposed printed circuit boards are exceptionally vulnerable to electrostatic discharge.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION DUE TO ELECTROSTATIC DISCHARGE DAMAGE

- Keep equipment in the protective conductive packaging until you are ready to install the equipment.
- Only install equipment in approved enclosures and / or locations that prevent casual access and provide electrostatic discharge protection as defined by IEC 1000-4-2.
- Use a conductive wrist strap or equivalent field force protective device attached to an earth ground when handling sensitive equipment.
- Always discharge yourself by touching a grounded surface or approved antistatic mat before handling the equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Before doing anything, make sure the device is connected to a suitable external power supply.
See **“5.4 - Power Supply”**

Before connecting the valve, carefully configure the driver by selecting the valve type from the list of compatible valves.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Verify the manufacturer valve parameter information before using your valve with the generic valve type.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Always remove power from the equipment before performing any maintenance on their electrical connections.
To help ensure proper connections, comply with the following:

- Power supplies other than those specified can seriously damage the system.
- Use cables of suitable section for the terminals used.
- Separate the cables of probes and digital inputs from inductive loads and high voltage connections to prevent any electromagnetic interference. Do not place the probe cables near other electrical equipment (switches, meters, etc.).
- Make connections as short as possible and do not wind them around electrically connected parts.
- To avoid causing static discharges, do not touch the electronic components on the boards.
- The device must be connected to a suitable power supply that complies with the specifications provided in the Specifications chapter.

4.1.5 - Analog Inputs-probes

Temperature probes have no connection polarity and can be extended using a normal bipolar cable (note that the extension of the probes influences the electromagnetic compatibility (EMC) of the instrument: take great care with the wiring).

NOTE: Probes which have a specific connection polarity, which must be observed.

NOTICE

INOPERABLE EQUIPMENT

Verify all wiring connections before applying power.

Failure to follow these instructions can result in equipment damage.

NOTE: Apply power to all externally powered devices after applying power to the **valve** drivers.

NOTE: Signal leads (probes, digital inputs, communication and the electronic supply) must be routed separately from power cables.

4.1.6 - Serial connections

Pay special attention when connecting serial lines. Miswiring may lead to malfunctioning or inoperable equipment.

Label	Description
TTL	Use a 5-wire TTL cable up to 30 cm in length.

Tab. 6 Serial connections

4.2 - Wiring diagrams

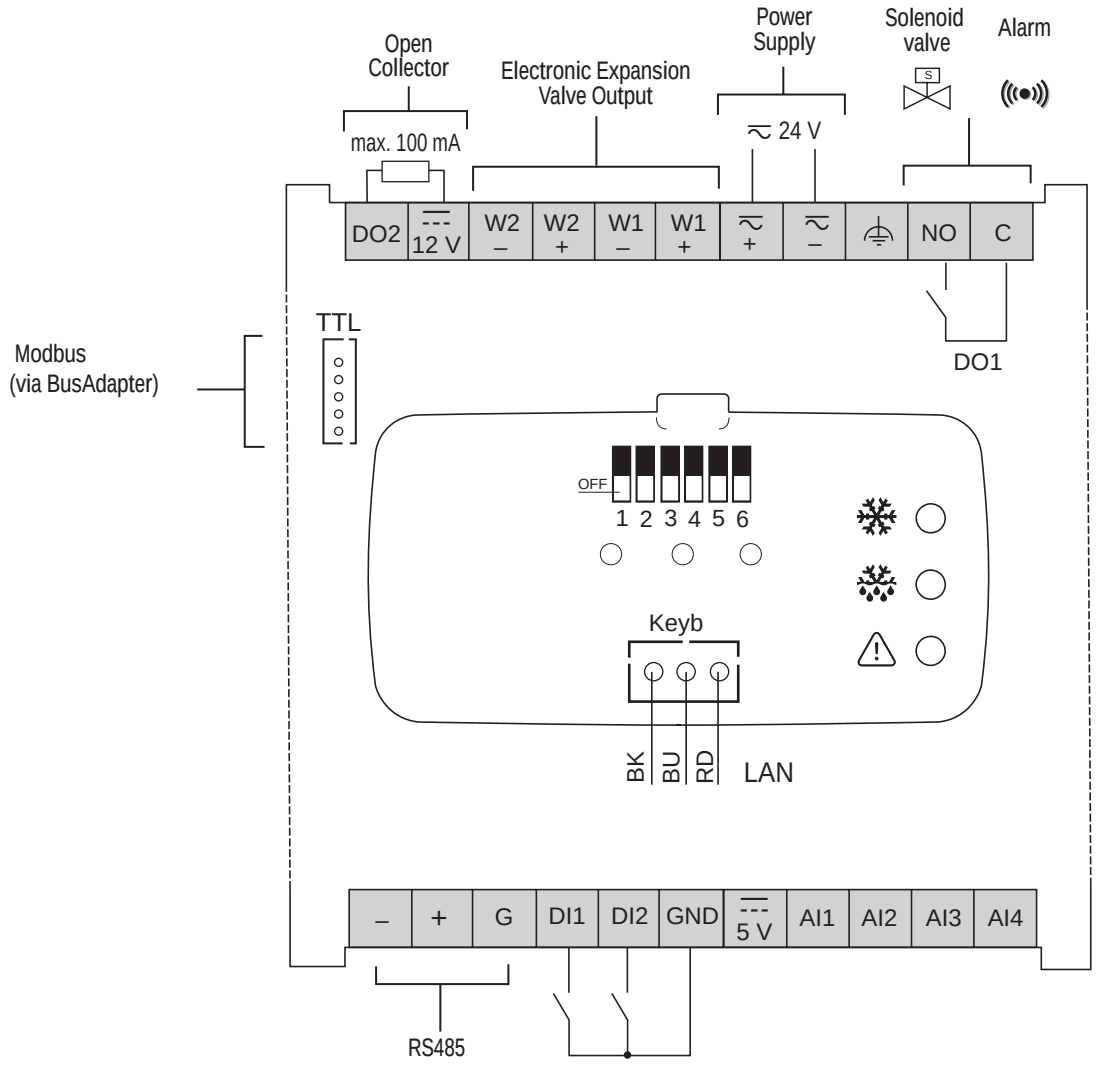
Miswiring can irreversibly damages the **valve** drivers.

NOTICE
INOPERABLE EQUIPMENT Verify all wiring connections before applying power. **Failure to follow these instructions can result in equipment damage.**

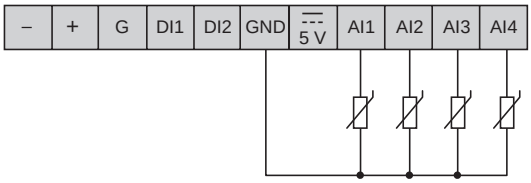
4.2.1 - Driver wiring diagrams

Terminal	Label	Description	Notes	Parameters
2-3*	Open collector	Solenoid valve/Alarm	2=dO; 3= 12V⎓ Max. LOAD 100mA	dL91
3	12V⎓	Probe power supply	Power supply for probes with current inputs 4..20mA and O.C.	-
4-5-6-7	Valve Output	Valve output	4= W2; 5=W2; 6=W1; 7=W1	-
8-9	Supply	Power supply	Power supply V⎓ 8=+; 9=- Respect the polarity	-
10		Earth**		-
11-12	DO1	Relay output	Solenoid valve · Alarm	dL90
14-15-16	485	Televis/Modbus Serial Direct connection		-
17*	DI1	Digital input 1	Connecting the digital inputs to a power supply output is strictly forbidden	dL40
18*	DI2	Digital input 2		dL41
19	GND	Ground		-
20	5V⎓	Probe power supply	For ratiometric probe	-
21	AI1	Analog input 1	Saturation probe	dL10 / dL11 / dL20
22*	AI2	Analog input 2	Backup saturation probe	dL12 / dL13 / dL21
23*	AI3	Analog input 3	Evaporator output probe (overheating)	dL22
24*	AI4	Analog input 4	Evaporator output probe (overheating) backup	dL23

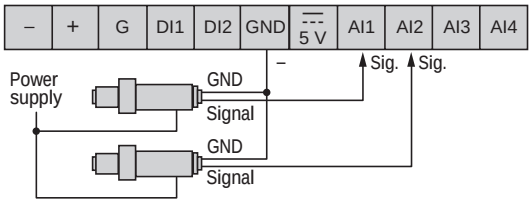
Tab. 7 Wiring diagrams



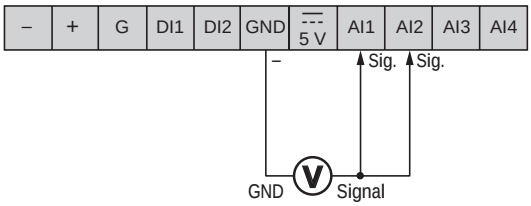
● NTC / PT1000 Probe Connection



● Current - Transducer 4...20 mA



● Voltage - Transducer 0...10V



● Voltage - 0...5V ratiometric or current

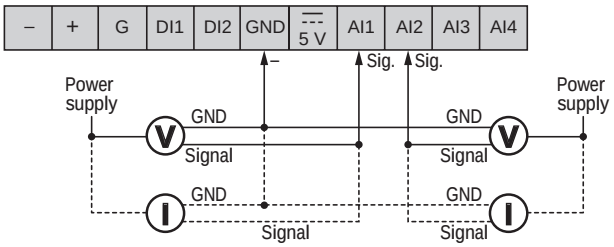


Fig. 9 reference wiring diagram

4.3 - Compatible valve connection

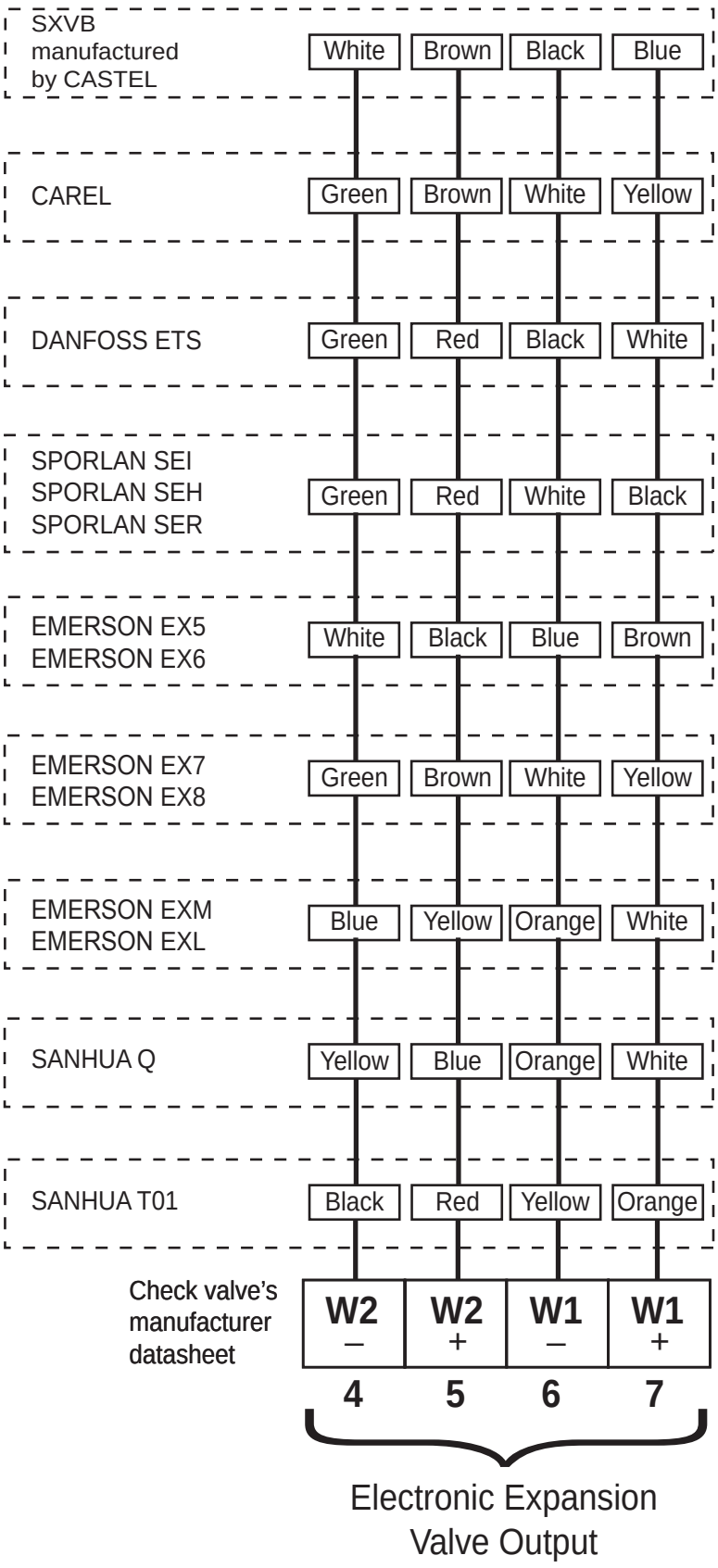


Fig. 13 Electronic Expansion Valve output

5 - TECHNICAL DATA

All **valve** drivers system components meet European Community (CE) and North American (UL) requirements for open equipment. You must install them in an enclosure or other location designed for the specific environmental conditions and to minimize the possibility of unintended contact with hazardous voltages. Use metal enclosures to improve the electromagnetic immunity of your **valve** drivers system. This equipment meets CE and UL requirements as indicated in the table below.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

Do not exceed any of the rated values specified within this chapter.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Applying incorrect current or voltage levels on analog inputs and outputs could damage the electronic circuitry.
Further, connecting a current input device to an analog input configure for voltage, and vice-versa, will likewise damage the electronic circuitry.

NOTICE

INOPERABLE EQUIPMENT

- Do not apply voltages above 11 Vdc to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-10 Vdc input.
- Do not apply current above 30 mA to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-20 mA or 4-20 mA input.
- Do not mismatch applied signal with analog input configuration.

Failure to follow these instructions can result in equipment damage.

5.1 - General specifications

NorthAmerican requirement and standards met	UL 60730
The product complies with the following Harmonised regulations	EN 60730-2-6 / EN 60730-2-9 / EN 60730-1
Use	Operating (not safety) device for incorporation
Mounting	on DIN Omega bar support
Type of action	1.B
Pollution class	2 (normal)
Over voltage category	II
Nominal pulse voltage	2500V
Digital outputs	Refer to the label on the device
Fire resistance category	D
Software class and structure	A
Type of disconnection or suspension for each circuit	Microswitch disconnection
PTI of materials used for insulation	PTI 250V
Period of electrical stress on the insulating parts	Long period

Tab. 8 Classification

	Standard	Min.	Max.
Supply voltage NON-insulated power supply	24V~/⎓ ±10%	-	-
Supply frequency	50Hz/60Hz	-	-
Power consumption	30VA / 25W	-	-
Insulation class	2	-	-
Working temperature	25 °C	-5 °C	55 °C
Operating environment humidity (non-condensing)	30 %	10 %	90 %
Storage temperature	25 °C	-20 °C	85 °C
Ambient storage humidity (non-condensing)	30 %	10 %	90 %

Tab. 9 General specifications

5.2 - Input/Output features

Type and Label	Description	Driver
Digital inputs ddi1 - ddi2	2 Clean contact digital inputs closing current for ground: 0.5mA	YES
Dangerous voltage Digital Outputs ddO1	1 SPST relay: N.O. 5A 250V~	YES
Analog Inputs dAi1 - dAi2 dAi3 - dAi4	**dAi1 - dAi2** 2 configurable inputs: a) NTC temperature 103AT-2 10kΩ, extended NTC NTCAp-2 10kΩ, Pt1000 b) current input 4...20 mA / ratiometric 0-5V c) voltage input 0-10V **dAi3 - dAi4** 2 configurable inputs as NTC temperature 103AT 10kΩ or Pt1000. Measurement range: -50°C - 99.9°C;	YES
Open Collector non-dangerous voltage SELV digital output ddO2	1 Open Collector output Max. current 100mA Voltage 12Vcc	YES

Tab. 10 Input/Output features

	NTC103* -50...+99.9 °C	NTC extended* -40...+150 °C	Pt1000* -50...+99.9 °C	4...20 mA	0..10V	0-5V
AI1	✔	✔	✔	✔	✔	✔
AI2	✔	✔	✔	✔	✔	✔
AI3	✔	✔	✔	-	-	-
AI4	✔	✔	✔	-	-	-
Corrective action	0.1 °C	0.1 °C	0.1 °C	0.1bar	0.1bar	0.1bar
F.S. precision	1%	1%	1%	1%	1%	1%
Impedence	-	-	-	100Ohm	21KOhm	110KOhm
NTC: NTC 103AT-2 (10kΩ @ 25°C) BETA value 3435 **NTC extended: NTC 103AP-2 (10KΩ @ 25°C), BETA value 3435** *** probes not included - contact the Hussmann Sales Office for accessories**						

Tab. 11 Analog Inputs features

5.3 - Serial features

Label	Description
TTL	TTL serial to connect Personal Computer via interface module
RS-485	RS-485 optoisolated on-board serial

Tab. 12 Serial features

5.4 - Power Supply

The **valve** drivers and associated devices require power supplies with a nominal voltage of 24 VAC / 24 VDC. The power supplies/transformers must be rated Safety Extra Low Voltage (SELV) according to IEC 61140. These sources of power are isolated between the electrical input and output circuits of the power supply as well as simple separation from ground (earth), PELV and other SELV systems.

⚠ ⚠ DANGER

GROUND LOOP CAUSING ELECTRIC SHOCK AND/OR INOPERABLE EQUIPMENT

- Do not connect the 0 V power supply/transformer connection supplying this equipment to any external ground (earth) connection.
- Do not connect any 0 V or ground (earth) of the sensors and actuators connected to this equipment to any external ground connection.
- If necessary, use separate power supplies/transformers to power sensors or actuators isolated from this equipment.

Failure to follow these instructions will result in death or serious injury.

If the specified voltage range is not maintained, or the effective separation of the SELV circuit connected to the concerned equipment is compromised, the products may not function as intended or may become damaged and inoperable.

⚠ WARNING

POTENTIAL OF OVERHEATING AND FIRE

- Do not connect the equipment directly to line voltage.
- Use only isolating SELV power supplies/transformers to supply power to this equipment.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The equipment must be connected to a suitable power supply/transformers with the following features:

Primary voltage	Depending on requirements of the individual device and/or country of installation.
Secondary voltage	24 V~/⎓
Power supply frequency V~	50/60Hz
Power	35VA

5.5 - Mechanical data

Description	References
Terminals and connectors:	
1 x JST 3-way JST connector	All references
Container:	
PC+ABS plastic resin with V0 flammability rating	All references

Tab. 13 Mechanical data

6 - USER INTERFACE

The interface, comprising the front cover of the controller, allows you to perform all operations needed to use the device.

Fig. 14 valve driver

6.1 - LEDs

There are 3 leds on the front of the driver which indicate the valve state.

Inside the door there are 3 more leds used to upload/download parameters and/or applications.

	LED	Colour	On	Flashing		Off
❄	EEV*	Green	Valve regulation	Valve closed (no control in progress) Setpoint satisfied		NA**
❄	Defrost*	Yellow	Defrosting on Valve closed (no control in progress)	No serial connection		No Defrost
⚠	Alarm	Red	NA	Alarm present	No serial connection	No alarm

Tab. 14 LEDs

7 - PHYSICAL INPUT/OUTPUT CONFIGURATION

From time to time, new input modules, output modules or other devices are made available that are not documented in the following information. For information on new devices, contact your local Hussmann representative.

NOTICE

INOPERABLE EQUIPMENT

Update the controller firmware to the latest version every time you install a newly released Input/Output expansion module or other device to this equipment.

Failure to follow these instructions can result in equipment damage.

NOTE: For more information on how to update the controller firmware, contact your local Hussmann representative.

Applying incorrect current or voltage levels on analog inputs and outputs could damage the electronic circuitry.
Further, connecting a current input device to an analog input configure for voltage, and vice-versa, will likewise damage the electronic circuitry.

NOTICE

INOPERABLE EQUIPMENT

- Do not apply voltages above 11 Vdc to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-10 Vdc input.
- Do not apply current above 30 mA to the analog inputs of the controller or Input/Output expansion module when analog input is configured as 0-20 mA or 4-20 mA input.
- Do not mismatch applied signal with analog input configuration.

Failure to follow these instructions can result in equipment damage.

7.1 - Analog inputs

There are a total of 4 Analog Inputs, referred to below as dAi1…dAi4.

Using the parameters, a physical resource (probe, digital input, voltage/current signal) can be “physically” configured for each type of input.

Inputs can be “physically” configured as specified in the following table.

PAr.	Description	0	1	2	3*	4*	5*	6
dL00	Type of analog input dAi1	Probe not configured	NTC probe	Pt1000	4-20 mA	Ratiometric 0-5V	0-10 V	NTC probe Extended
dL01	Type of analog input dAi2	Probe not configured	NTC probe	Pt1000	4-20 mA	Ratiometric 0-5V	0-10 V	NTC probe Extended
dL02	Type of analog input dAi3	Probe not configured	NTC probe	Pt1000	-	-	-	-
dL03	Type of analog input dAi4	Probe not configured	NTC probe	Pt1000	-	-	-	-

Tab. 21 Configuration of Analog Inputs

* If **dL00**/**dL01** = 3 or 4 or 5 the value read by the probe is automatically converted into a saturation temperature value.

Analog Input	Parameter	Range	Description
dAi1	dL10	dL11...999.9	Analog Input fullscale value dAi1
dAi1	dL11	-14.5...dL10	Analog Input start of scale value dAi1
dAi2	dL12	dL13...999.9	Analog Input fullscale value dAi2
dAi2	dL13	-14.5...dL12	Analog Input start of scale value dAi2

Tab. 22 Description of Analog Inputs

The values read by analog inputs can be configured in the parameters dL20...dL23

Parameter	Description	Unit of Measure	Range
dL20	Analog Input differential dAi1	bar/PSI -°C/°F	-12.0…12.0
dL21	Analog Input differential dAi2	bar/PSI -°C/°F	-12.0…12.0
dL22	Analog Input differential dAi3	°C/°F	-12.0…12.0
dL23	Analog Input differential dAi4	°C/°F	-12.0…12.0

Tab. 23 Analog Inputs calibration

The Analog Inputs can be configured according to the following table.

PAr.	Function	Value	Description	Factory settings
dL30	Configuration of Analog Input dAi1	0...5	• **0**= disabled • **1**= evaporator output (overheating) • **2**= saturation • **3**= backup evaporator output (overheating) • **4**= backup saturation • **5**= valve opening direct control	Saturation probe
dL31	Configuration of Analog Input dAi2	0...5		Backup saturation probe
dL32	Configuration of Analog Input dAi3	0...4	• **0**= disabled • **1**= evaporator output (overheating) • **2**= saturation • **3**= backup evaporator output (overheating) • **4**= backup saturation	Evaporator output probe (overheating)
dL33	Configuration of Analog Input dAi4	0...4		Backup evaporator output probe (overheating)

Tab. 24 Configuration of Analog Inputs

7.1.1 - Valve opening direct control

If inputs Ai1 and dAi2 are “physically” configured in voltage or current, they are configurable for valve opening direct control as shown in the following table.

PAr	Function	Value
dL00	Analog Input type dAi1	3-4-5
dL01	Analog Input type dAi2	3-4-5
dL30	Configuration of Analog Input dAi1	5
dL31	Configuration of Analog Input dAi2	5

Tab. 25 Configuration of valve opening direct control

In this case the input is converted linearly as a percentage, again using the parameters:

PAr	Function	Range
dL10	Analog Input full scale value dAi1	dL11...999.9
dL11	Analog Input start of scale value dAi1	-14.5...dL10
dL12	Analog Input full scale value dAi2	dL13...999.9
dL13	Analog Input start of scale value dAi2	-14.5...dL12

Tab. 26 Configuration of valve opening direct control

You must set:

dAi1

- dL10 to a value corresponding to a signal of 10V or 20mA
- dL11 to a value corresponding to a signal of 0V or 4mA

dAi2

- dL12 to a value corresponding to a signal of 10V or 20mA
- dL13 to a value corresponding to a signal of 0V or 4mA

Valve opening percentage

- **dAi1(2) < -5.0**: a valve opening percentage of 0% is controlled with override (reset, repeated until the signal stays below -5.0)
- **-5.0< dAi1 < 0.0**: valve opening percentage of 0% is controlled
- **dAi1(dAi2) > 0.0**: the valve opening percentage is equal to the dAi1 value (dAi2).

7.2 - Digital inputs

There are of 2 no voltage digital inputs referred to below as ddi1…ddi2.

The Digital inputs can be configured as shown in the following table.

PAr.	Function	Value	Description	Notes
dL40	Configuration digital input ddi1	-7...+7	• **0** = digital input not configured • **±1** = ON/OFF adjustment • **±2** = defrost • **±3** = alarm • **±4** = system operating mode (only modes 0 and 1) • **±5** = main serial communication protocol • **±6** = ON/OFF adjustment with delay* • **±7** = complete valve opening	• The positive values (+) mean active for closed contact, the negative values (-) mean active for open contact • if configured (For values ≠ 0) the Digital inputs always have priority over any serial commands • dL40 = dL41 digital input ddL1 has priority
dL41	Configuration digital input ddi2	-7...+7		

Tab. 27 Digital Inputs configuration

*in OFF **the driver••** force valve open @ 50% for 40 seconds

7.3 - Digital outputs

PAr.	Function	Value	Description	Notes
dL90	digital output configuration ddO1 (on relay)	-2…2	• **0** = output controlled from serial • **±1** = solenoid valve control • **±2** = alarm output	The positive values (+) indicate active for closed contact, the negative values (-) indicate active for open contact.
dL91	digital output configuration ddO2 (Open Collector)	-2…2	• **0** = output controlled from serial • **±1** = solenoid valve control • **±2** = alarm output	

Tab. 28 Digital output configuration

7.4 - DIP switch table

Inside the door there are 6 selectors (DIP switches) used for quick selection of refrigerant and network address

The refrigerant can be selected using parameter **dE02**. In this case set the DIP switches to configuration 7 according to the table below.

Function	Configuration	Refrigerant	Selectors (DIP switches)					
			1	2	3	4	5	6
Refrigerant selection	0	R404A	-	-	-	OFF	OFF	OFF
	1	R22	-	-	-	ON	OFF	OFF
	2	R410A	-	-	-	OFF	ON	OFF
	3	R134A	-	-	-	ON	ON	OFF
	4	R744 (CO_2)	-	-	-	OFF	OFF	ON
	5	R407C	-	-	-	ON	OFF	ON
	6	R427A	-	-	-	OFF	ON	ON
	7	Set by parameter dE20 R404A default	-	-	-	ON	ON	ON
	Configuration	**Action**	**1**	**2**	**3**	**4**	**5**	**6**
Not Used	8							
	9							
	XVD address		**1**	**2**	**3**	**4**	**5**	**6**
Select network address	0		-	-	OFF	-	-	-
	1		-	-	ON	-	-	-

Tab. 29 DIP switch

8 - FUNCTION

8.1 - Introduction

The driver controls stepper type electronic expansion valves that regulate the minimum superheat value at the evaporator output.

Refer to **(Fig. 16)**.

The control value is the percentage of valve opening which is translated into a percentage of valve output enabling according to the following parameters:

- **dE10** - maximum percentage of valve opening is the maximum opening of the valve;
- **dE14** - minimum useful valve opening percentage is the minimum useful valve opening;
- **dE15** - maximum useful valve opening percentage is the maximum useful valve opening.
- If the regulator controls an output of more than or equal to **dE15**, the actual output is equal to **dE10**.
- If **dE15** > **dE10** the function is ignored.
- If the regulator controls an output of less than or equal to **dE14**, the actual output is equal to 0.
- If the regulator controls an output of more than or equal to **dE10**, for more than the time set in **dE13** a maximum opening alarm **dA07** is generated to indicate a critical system situation such as insufficient load, undersizing, etc.
- To disable the signal, set **dE13**=0.

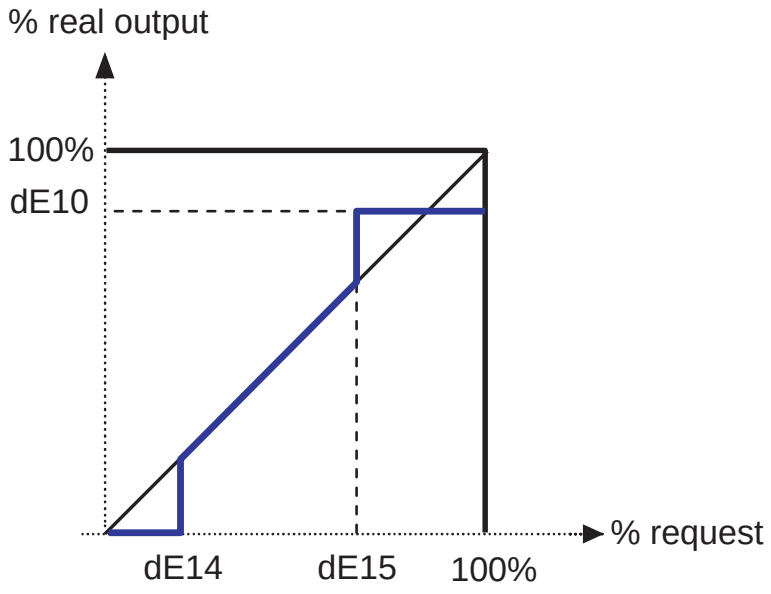


Fig. 16 Operating graph

8.2 - Saturation set

The driver calculates the actual superheat value using the two Analog Inputs, superheat **dAi3** and saturation **dAi1**.

A PID controller modulates the valve opening so make the superheat reach the setpoint **dE32**. The algorithm is dynamic: the effective superheat value may not reach the set Setpoint or may temporarily fall below this value.

If this causes liquid to be present at the output from the evaporator the setpoint dE32 value must be increased.

* Valid for **dE30**=1.

8.3 - Type of system dE21

The PID configuration parameters are loaded automatically by the device selecting the type of system defined by the parameter **dE21**.

8.4 - MOP (Maximum Operating Pressure)

MOP control has a threshold set by the pressure setpoint **dE52**.

If the threshold is exceeded for more than **dE53**, a MOP alarm is generated

(refer to **“10 - ALARMS”**).

- MOP control can be enabled using parameter **dE50**.
- MOP control can be disabled when the device is switched on/after a defrost condition for an amount of time equal to **dE51**. This allows the pressure to drop below a given level when the system is switched back on.

9- PARAMETERS (PAr)

The parameters can be set to fully configure the driver. The parameters can be modified via:

- Personal Computer.

The following sections provide a detailed analysis of each parameter, divided into categories (folders).

Each folder is designated with a label showing 2 figures (example: dF, UI, etc.).

Folder label	Meaning of label	Parameters of
dL	driver Locator configuration	I/O configuration
dF	driver protocol configuration	Protocol Configuration
dE	driver valve configuration	Valve configuration
Ui	User interface	User interface

Tab. 31 Parameters (PAr)

Unless otherwise indicated, the parameter is always visible and modifiable, unless customized settings have been configured via serial.

Both parameters and folder visibility can be controlled (See Folder table).
If folder visibility is modified, the new setting will apply to all parameters in the folder.

9.1 - Levels of visibility

There are 4 levels of visibility that can be set by assigning appropriate values to each parameter in the folder, only via serial, software (DeviceManager or other communication SW) or programming key.

The visibility levels are:

- value 3 = parameter or folder always visible;
- value 2 = manufacturer level; these parameters can only be viewed by enter the manufacturer's password (see parameter **Ui28**) (all parameters specified as always visible, parameters visible at installer level and manufacturer level will be visible);
- value 1 = installer level; these parameters can only be viewed by enter the installation password (see parameter **Ui27**) (all parameters specified as always visible, and parameters visible at installer level will be visible);
- value 0 = parameter or folder NOT visible.

Parameters and/or folders with a level of visibility other than 3 (password-protected) will be visible only if the correct password is entered (installer or manufacturer) following this procedure.

Parameters and/or folders with a level of visibility = 3 are always visible even without a password: in this case, the following procedure is not necessary.

9.2 - Parameter table/visibility, display folder table and Client table

The tables below list all information required to read, write and decode all accessible resources in the device.

There are 3 tables:

- the **parameter table** lists all controller configuration parameters saved in the non-volatile memory, including visibility;
- the **folder table** lists all parameter folder visibility details;
- the **client table** includes all I/O and alarm status resources available in the volatile memory of the instrument.

Description of columns:

Description of columns contains a legend to explain parameter table.

FOLDER	This Indicates the label of the folder containing the parameter in question.
LABEL	This indicates the label used to display the parameters in the menu of the controller.
PAR. ADDR.	The whole part represents the address of the MODBUS register containing the value of the resource to be read or written in the controller. The value after the point indicates the position of the most significant data bit inside the register; if not indicated it is taken to be zero. This information is always provided when the register contains more than one information item, and it is necessary to distinguish which bits actually represent the data (the working size of the data indicated in the column DATA SIZE is also taken into consideration). Given that the modbus registers have the size of one WORD (16 bit), the index number after the point can vary from 0 (least significant bit –LSb–) to 15 (most significant bit –MSb–).
VIS. PAR. ADDR.	The same as above. In this case, the MODBUS register address contains the visibility value of the parameter. By default all parameters have: • Data size: 2 bit • Range: 0…3 • Visibility: * 3 • U.M.: num * Refer to **"6.8 - Setting a password (Par/PASS folder)" on page 47**.
RESET (Y/N)	Indicates whether the device MUST be rebooted after the parameter has been changed; • Y=YES the device MUST be rebooted to save the change; • N=NO the device DOES NOT need to be rebooted after changing the parameter.
R/W	Indicates if resources are read/write, read-only or write-only: • R: the resource is read-only; • W: the resource is write-only; • RW: the resource is both read and write.
DATA SIZE	Indicates the size of the data in bits. • WORD = 16 bit • Byte = 8 bit • "n" bit = 1...15 bit based on the value of "n"
DESCRIPTION	This is the description of parameter functionality
RANGE	Describes the interval of values that can be assigned to the parameter. It can be correlated with other instrument parameters (indicated in the parameter label). If the real value is outside the permitted limits for the parameter (for example, because other parameters defining the limits have been changed), the limit that has been passed and not the actual value will be displayed.
CPL	When the field indicates "Y", the value read by the register needs to be converted because the value represents a number with a sign. In other cases the value is always positive or null. To carry out the conversion, proceed as follows: • if the value in the register is between 0 and 32,767, the result is the value itself (zero and positive values); • if the value in the register is between 32,768 and 65,535, the result is the value of the register – 65,536 (negative values)
EXP	If -1 is the value read from the register, divide by 10 (value/10) to convert it to the values given in the RANGE and DEFAULT columns and the unit of measurement specified in the U.M. column.

	Indicates the factory setting for the **TM171VEVM4** reference. **Example.** Parameter dL01 = 50.0. Column EXP = -1: • The value read by the device is 50.0; • The value read by the register is 500 --> 500/10 = 50.0.

Examples for PAR ADDR. (in binary form the least significant bit is the first on the right):

ADDR	DATA SIZE	Value	Content of register	
8806	WORD	1350	1350	0000010101000110)
8806	Byte	70	1350	(00000101**01000110**)
8806.8	Byte	5	1350	(**00000101**01000110)
8806.14	1 bit	0	1350	(0**0**000010101000110)
8806.7	4 bits	10	1350	(00000**1010**1000110)

Tab. 32 Description of columns

IMPORTANT: when the register contains more than one piece of data, the write procedure is as follows:

1. read current register value;
2. modify the bits for the resource concerned;
3. write the register.

Examples for VIS. PAR. ADDR. (in binary form the least significant bit is the first on the right):

ADDR	DATA SIZE	Value	Content of register	
49482	2 bit	0	120	(0000000001111**00**)
49482.2	2 bit	2	120	(0000000001111**10**00)
49482.4	2 bit	3	120	(000000000**11**1000)
49482.6	2 bit	1	120	(000000000**01**111000)

Tab. 33 Default visibility

ADDR	DATA SIZE	Value	Content of register	
49484	2 bit	0	72	(000000000**00**1000)

Tab. 34 Visibility modified

9.2.1 - Parameter table / visibility

NOTE: changing parameter values can cause drivers to stop working while waiting for external input via RS485 (RS485 not supported on this reference).

NOTICE

INCORRECT CONFIGURATION OF PARAMETERS

Do not change the value of the parameters present in **GREY** cells.

Failure to follow these instructions can result in equipment damage.

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
'dF' FOLDER										
dF00	49158	49434.6	N	RW	BYTE	Select COM0 protocol • **0** = RESERVED; • **1** = MODBUS; • **2** = NOT USED • **3** = NOT USED	0...3			1
dF02	49200	49435.2	N	RW	BYTE	Control from digital inputs or serial port. • **0** = digital input • **1** = RS485 (reference **TM171VEVM4**) • **2*** = RS485 + shared probe (reference **TM171VEVM4**) • **3*** = digital input + shared probe *shared probe refers to a value written via serial to dedicated addresses, for the temperature/pressure probes configured appropriately but not connected. **Note**: IF **dL40** and/or **dL41** ≠ 0 the control comes from the serial. The Digital inputs DI1, DI2 (when appropriately configured ≠ 0) in any case ALWAYS have priority over the commands received from the serial.	0...3			1
dF20	49172	49437	N	RW	BYTE	Eliwell protocol controller address. **dF20**= address of the device within the family (valid values from 0 to 14) **dF21** = device family (valid values from 0 to 14) The two values **dF20** and **dF21** represent the network address of the device and the pair are indicated in the following format: "FF.DD" (where FF = **dF21** and DD = **dF20**).	0...14			0
dF21	49173	49437.2	N	RW	BYTE	Eliwell protocol controller family. See **dF20.**	0...14			0
dF30	49175	49437.6	Y	RW	BYTE	Modbus protocol controller address.	0...255			1

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
dF31	49176	49438	Y	RW	BYTE	Modbus protocol Baudrate • **0** = 1200 baud • **1** = 2400 baud • **2** = 4800 baud • **3** = 9600 baud • **4** = 19200 baud • **5** = 38400 baud • **6** = 57600 baud • **7** = 115200 baud	0...7			3
dF32	49177	49438.2	Y	RW	BYTE	Modbus protocol parity • **0** = NONE • **1** = EVEN (parity) • **2** = ODD (disparity)	0...2			1
dF60	16426	49440	N	RW	WORD	Client code 1	0...999			0
dF61	16428	49440	N	RW	WORD	Client code 2	0...999			0
						'dL' FOLDER				
dL00	50894	49429.2	Y	RW	BYTE	Analog Input type **dAi1**. • **0** = Probe not configured • **1** = NTC • **2** = Pt1000 • **3** = 4..20mA • **4** = Ratiometric transducer 0-5V • **5** = 0-10V • **6** = NTC extended	0...6			3
dL01	50895	49429.4	Y	RW	BYTE	Analog Input type dAi2. See **dL00.**	0...6			3
dL02	50896	49429.6	Y	RW	BYTE	Analog Input type **dAi3** • **0** = Probe not configured • **1** = NTC • **2** = Pt1000 • **3, 4, 5** = NOT USED • **6** = NTC extended	0...6			1
dL03	50897	49430	Y	RW	BYTE	Analog Input type **dAi4**. See **dL02**	0...6			1
dL08	50923	49430.2	N	RW	BYTE	°C/°F selection. **0**= °C; **1**= °F.	0...1			0
dL09	50924	49430.4	N	RW	BYTE	Pressure unit of measure. **0**= bar **1**= PSI.	0...1			0
dL10	18130	49430.6	N	RW	WORD	Analog Input fullscale value **dAi1**.	**dL11**...9999	Y	-1	70
dL11	18140	49431	N	RW	WORD	Analog Input start of scale value **dAi1**.	-145...**dL10**	Y	-1	-5
dL12	18132	49431.2	N	RW	WORD	Analog Input full scale value **dAi2**.	**dL13**...9999	Y	-1	70
dL13	18142	49431.4	N	RW	WORD	Analog Input start of scale value **dAi2**.	-145...**dL12**	Y	-1	-5
dL20	50918	49431.6	Y	RW	BYTE	Analog Input differential **dAi1**.	-120...120	Y	-1	0
dL21	50919	49432	Y	RW	BYTE	Analog Input differential **dAi2**.	-120...120	Y	-1	0
dL22	50920	49432.2	Y	RW	BYTE	Analog Input differential **dAi3**.	-120...120	Y	-1	0
dL23	50921	49432.4	Y	RW	BYTE	Analog Input differential **dAi4**.	-120...120	Y	-1	0
dL30	50934	49432.6	N	RW	BYTE	Configuration of Analog Input **dAi1**. • **0**= disabled • **1**= evaporator output (overheating) • **2**= saturation • **3**= backup evaporator output (overheating) • **4**= backup saturation • **5**= valve opening direct control	0...5			2
dL31	50935	49433	N	RW	BYTE	Configuration of Analog Input dAi2. See **dL30.**	0...5			4

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
dL32	50936	49433.2	N	RW	BYTE	Configuration of Analog Input **dAi3**. • **0**= disabled • **1**= evaporator output (overheating) • **2**= saturation • **3**= backup evaporator output (overheating) • **4**= backup saturation	0...4			1
dL33	50937	49433.4	N	RW	BYTE	Configuration of Analog Input dAi4. See **dL32.**	0...4			3
dL40	50926	49433.6	Y	RW	BYTE	Configuration of digital input **ddi1** • **0** = digital input not configured • **±1** = ON/OFF adjustment • **±2** = defrost • **±3** = alarm • **±4** = system operating mode (only modes 0 and 1) • **±5** = main serial communication protocol • **±6** = ON/OFF adjustment with delay (OFF → valve open 50% for 40 secs) • **±7** = complete valve opening	-7...7	Y		0
dL41	50927	49434	Y	RW	BYTE	Configuration of digital input **ddi2**. See **dL40.**	-7...7	Y		0
dL90	50940	49434.2	Y	RW	BYTE	Digital outputs configuration **ddO1** (relay) • **0** = output controlled from serial • **±1** = solenoid valve control • **±2** = alarm output	-2...2	Y		1
dL91	50941	49434.4	Y	RW	BYTE	Digital output configuration **ddO2** (**O.C.**) See **dL90.**	-2...2	Y		0
'dE' FOLDER										
dE00	49201	49442	Y	RW	BYTE	Valve reference See **"10.2.2 - Valve configuration parameters" on page 69** • **0**= customisable (see **"10.2.3 - Valve configuration parameter table dE01...dE09, dE80 con dE00 = 0" on page 70**) For values from 1 to 15 see **"10.2.4 - Valve configuration parameter table dE01...dE09, dE80 con dE00 ≠ 0" on page 72** • **1** = DANFOSS ETS50 • **2** = DANFOSS ETS100 • **3** = ALCO EX4 EX5 EX6 • **4** = NOT USED • **5** = ALCO EX7 • **6** = ALCO EX8 • **7** = CAREL E2V E3V E4V E5V E6V E7V • **8** = SPORLAN SER 1.5 TO 20 • **9** = SPORLAN SEI-30 • **10** = SPORLAN SEI-50 • **11** = NOT USED • **12** = SPORLAN SER(I) G, J, K, B, C, D • **13** = ALCO EXM246 • **14** = SANHUA DPF(Q)/DPF(T01) • **15** = SXVB manufactured by CASTEL	0...15			8

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
For the description of parameters **dE01...dE09, dE80** see: **“10.3.4. Valve configuration parameter table dE01...dE09, dE80 con dE00 = 0” Parameters dE01…dE09/dE80 are visible and settable from the keyboard only if dE00=0.**										
dE10	49208	49442.2	N	RW	BYTE	**Maximum valve opening percentage** Defines the maximum valve opening value, meaning the actuation limits in percentages. 0 indicates valve completely closed.	0...100			100
dE11	49209	49442.4	N	RW	BYTE	**Valve actuation percentage after blackout** Value calculated automatically but settable using this parameter for first start-up.	0...100			0
dE12	49210	49442.6	N	RW	BYTE	**Valve actuation percentage after defrost** Value calculated automatically by settable via this parameter for first start-up. If **dE12**=0 the percentage is defined by **dE11**.	0...100			0
dE13	49211	49443	N	RW	BYTE	**Operating time at max opening for alarm signal** if the valve opening remains at a value of greater than **dE10** for the time set by **dE13** a maximum opening alarm will be given **dA07** (see “Alarms chapter”) If **dE13**=0 signal disabled.	0...255			60
dE14	49212	49443.2	N	RW	BYTE	**Minimum valve useful opening percentage** If the regulator commands an output of less than or equal to **dE14**, the actual output = 0.	0...**dE15**			0
dE15	49213	49443.4	N	RW	BYTE	**Maximum valve useful opening percentage** If the regulator commands an output of more than or equal to **dE15** the actual output is **dE10** (with **dE15** < **dE10**). Ignored if **dE15** > **dE10**.	**dL14**...**dL10**			100
dE16	49214	49443.6	N	RW	BYTE	**Valve opening percentage during probe error** If a probe error sets the valve opening, in percentage, for a time **dE13**.	0...100			0
dE19	49222	49444	N	RW	BYTE	**Tolerance on winding resistance Stepper motor**	0...255			65
dE93	49231	49444.2	N	RW	BYTE	**Period of motor enabling/disabling** Sets the enabling/disabling cycle (Duty cycle) of the stepper motor. See **dE08**	0...255			10
dE20	49215	49444.4	N	RW	BYTE	**Select type of gas** Use only if the configuration via Dip Switch is set to 7. If not **dE20** will be ignored. • **0 = R404A;** • **1 = r22;** • **2 = R410a;** • **3 = R134a;** • **4 = R744 (C02);** • **5 = R407C;** • **6 = R427A;** • **7 = customisable**	0...7			7

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
dE21	49216	49444.6	N	RW	BYTE	Type of system operating mode 0 • **0** = User setting • **1** = ducted refrigeration unit and evaporation pressure quickly modifiable (e.g. step control) • **2** = ducted refrigeration unit and evaporation pressure controlled (e.g. INVERTER control) • **3** = refrigeration unit with on-board compressor • **4** = refrigeration unit with on-board compressor and renewing exchanger • **5, 6** = NOT USED • **7** = conditioning unit with plate exchanger • **8** = conditioning unit with shell and tube exchanger • **9** = conditioning unit with ribbed battery exchanger • **10** = conditioning unit with variable refrigerating capacity • **11** = perturbed conditioning unit • **12, 13, 14, 15, 16** = NOT USED	0...16			7
dE22	49225	49445	N	RW	BYTE	Type of system operating mode 1. See **dE02**	0...16			7
dE23	49226	49445.2	N	RW	BYTE	Type of system operating mode 2. See **dE02**	0...16			7
dE24	49227	49445.4	N	RW	BYTE	Type of system operating mode 3. See **dE02**	0...16			7
dE30	49308	49445.6	N	RW	BYTE	Enable overheating recalculation reference. Used to enable the automatic recalculation of the referred Setpoint in order to regulate the overheating. **0**= recalculation disabled. (Setpoint = **dE31**); **1**= automatic recalculation enabled	0...1			0
dE31	16512	49446	N	RW	WORD	Overheating upper threshold Used to set the setpoint SP4 to **dE31** (SP2) to regulate the overheating following a black-out or at the end of defrost. Active for the time set by **dE51** (or when the MOP function is disabled)	0...1000		-1	60
dE32	16510	49446.2	N	RW	WORD	Overheating lower threshold Used to set the setpoint SP2 to regulate the overheating (objective overheating) If **dE30**=1 and the calculated setpoint <**dE32**, then the dynamic setpoint will be = **dE32**.	0...1000		-1	60
dE33	16514	49446.4	N	RW	WORD	Overheating reference recalculation period Valid for **dE30**=1. Defines the recalculation period of the dynamic setpoint (every **dE33** seconds).	0...999			20
dE34	16516	49446.6	N	RW	WORD	Overheating recalculation step. Dynamic setpoint varies by **dE34** degrees according to the overheating value compared to **dE32**.	0...1000		-1	1
dE35	16470	49447	N	RW	WORD	Valve opening freezing timer after OFF->ON	0...1999			0
dE36	16518	49447.2	N	RW	WORD	Overheating proportional band	-9999...-1	Y	-1	-100
dE37	16520	49447.4	N	RW	WORD	Overheating full time	0...1999			40
dE38	16522	49447.6	N	RW	WORD	Overheating derivative time	0...1999			0

LABEL	PAR. ADDR	VIS. PAR. ADDR	RESET (Y/N)	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
dE47	49329	49450	N	RW	BYTE	Enable valve manual opening **0**= automatic valve opening; **1**= manual valve opening	0...1			0
dE48	16546	49450.2	N	RW	WORD	Valve manual opening **Note**: valid if **dE47**=1. **Note**: valve opening switched from automatic to manual (**dE47**=1) the opening percentage is not 0% as per default parameter but the percentage indicated by this parameter	0.0...100.0		-1	0
dE50	49270	49450.4	N	RW	BYTE	Enable MOP **0**= MOP disabled; **1** = MOP enabled.	0...1			0
dE51	16478	49450.6	N	RW	WORD	MOP disable duration at start-up. MOP activation delay on switching-on or after defrost.	0...999			0
dE52	16472	49451	N	RW	WORD	Evaporator temperature upper threshold MOP setpoint	-60.0...100.0	Y	-1	0
dE53	49271	49451.2	N	RW	BYTE	Min time that temp upper threshold is exceeded for alarm activation If the **dE52** threshold is exceeded for longer than **dE53** the MOP alarm is given.	0...255			180
'Ui' FOLDER										
Ui27	17988	49458.6	N	RW	WORD	Installation password	0...255			1
Ui28	17990	49459	N	RW	WORD	Manufacturer password	0...255			2

Tab. 35 Parameters / visibility

9.2.2 - Valve configuration parameters

dE00	Type of VALVE	dE01	dE02	dE03	dE04	dE05	dE06	dE07	dE08	dE09	dE80
-		steps/s	steps	steps	mA	Ohm	mA	num	%	10*ms/step	steps/s
0	**Customisable**	200	1596	100	120	100	50	0	100	50	10
1	**DANFOSS** ETS50	160	2625	160	100	52	75	0	100	50	15
2	**DANFOSS** ETS100	300	3530	160	100	52	75	0	100	50	10
3	**ALCO** EX4 EX5 EX6	500	750	100	500	13	100	0	100	50	10
4	VALUE NOT USED	-	-	-	-	-	-	-	-	-	-
5	**ALCO** EX7	210	1600	100	750	8	250	0	100	50	10
6	**ALCO** EX8	500	2600	100	800	6	500	0	100	50	10
7	**CAREL** E2V-E3V-E4V E5V-E6V-E7V	45	480	70	450	36	100	5	30	250	10
8	**SPORLAN** SER	200	1596	100	120	100	50	0	100	50	10
9	**SPORLAN** SEI-30	200	3193	100	160	75	50	0	100	50	10
10	**SPORLAN** SEI-50 SEH*	200	6386	100	160	75	50	0	100	50	10
11	VALUE NOT USED	-	-	-	-	-	-	-	-	-	-
12	SPORLAN SER(I) G, J, K, B, C, D	160	2500	100	120	100	50	0	100	255	12
13	**ALCO** EXM246-EXL246	45	250	100	65	250	65	1	100	50	10
14	**SANHUA** DPF(Q)-DPF(T01)	40	250	50	105	92	35	1	100	50	10
15	ELIWELL **SXVB** manufactured by CASTEL	20	195	60	-200	54	50	0	100	50	10

Tab. 36 Valve configuration parameters

*Sporlan SEH: bipolar reference only

9.2.3 - Valve configuration parameter table dE01...dE09, dE80 con dE00 = 0

NOTE: The parameter visibility cannot be set via the serial.
Check the data given in the valve manufacturer's manual for the correct configuration.

dE00	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
0	dE01	16722	RW	WORD	**Stepper motor maximum speed** Defines the maximum valve motor speed to guarantee step precision and integrity	0...9999			200
0	dE02	16754	RW	WORD	**Stepper motor complete opening** Defines the maximum number of valve steps. The total travel refers to the FULL STEP mode (**dE07** = 0). The valve opening is complete when this value is reached.	0...9999			1596
0	dE03	49553	RW	BYTE	**Stepper motor extra movement in total closure** Defines the number of extra valve steps beyond the limit switch to guarantee correct total closure. A total closure command implies the valve positioned to zero and a further number of steps **dE03**.	0...255			100
0	dE04	16802	RW	WORD	**Stepper motor winding maximum current** Defines the maximum current for the phase used by the valve (maximum torque). Negative current value: the maximum current will be set to the value with no sign (absolute) **dE04** with an extra 50% with the valve movement command (starting or end point) within 5% of total opening, to a value equal to the absolute value of **dE04** for the other movements.	-1999...9999			120
0	dE05	49601	RW	BYTE	**Stepper motor winding resistance** Defines the electrical resistance of the single phase winding (verify connections)	0...255			100
0	dE06	16850	RW	WORD	**Stepper motor winding rated current** Defines the phase circulating current in the valve stop condition (minimum torque)	0...9999			50

dE00	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
0	dE07	49649	RW	BYTE	**Type of stepper motor control** Defines the piloting modes. • **0** = FULL STEP • **1** = HALF STEP • **2** = MICRO STEP **CAREL valves** • **3**= FULL STEP CAREL valves • **4**= HALF STEP CAREL valves • **5**= MICRO STEP CAREL valves **3...5** values are reserved to pilot CAREL valves Note that the current piloting is a maximum value for the FULL STEP mode while the other two modes, modulating the value of the winding currents, offers greater resolution and fluidity of movement but with less torque. Refer to the literature concerning step-by-step motors for more detail	0...5			0
0	dE08	50961	RW	BYTE	**Stepper motor enabling/disabling duty cycle** If the case of valve overheating, reduce the enabling duty cycle to allow it to cool down	0...100			100
0	dE09	50977	RW	BYTE	**Stepper motor acceleration/deceleration** Defines the acceleration/deceleration in motor start/stop. The time between one step and the next is reduced by **dE09** at each step until **dE01** is reached. If =0 acceleration is not applied.	0...255			50
0	dE80	50993	RW	BYTE	**Minimum stepper motor speed in acceleration/deceleration** Defines the minimum speed at which the motor starts and stops	0...255			10

Tab. 37 Valve configuration parameters dE01...dE09, dE80 con dE00 = 0

9.2.4 - Valve configuration parameter table dE01...dE09, dE80 con dE00 ≠ 0

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
1	DANFOSS ETS50	dE01	16722	RW	WORD	Stepper motor maximum speed	0...9999			160
1	DANFOSS ETS50	dE02	16754	RW	WORD	Stepper motor complete opening	0...9999			2625
1	DANFOSS ETS50	dE03	49553	RW	BYTE	Stepper motor extra movement in total closure	0...255			160
1	DANFOSS ETS50	dE04	16802	RW	WORD	Stepper motor winding maximum current	-1999...9999			100
1	DANFOSS ETS50	dE05	49601	RW	BYTE	Stepper motor winding resistance	0...255			52
1	DANFOSS ETS50	dE06	16850	RW	WORD	Stepper motor winding rated current	0...9999			75
1	DANFOSS ETS50	dE07	49649	RW	BYTE	Type of stepper motor control	0...5			0
1	DANFOSS ETS50	dE08	50961	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
1	DANFOSS ETS50	dE09	50977	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
1	DANFOSS ETS50	dE80	50993	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			15
2	DANFOSS ETS100	dE01	16724	RW	WORD	Stepper motor maximum speed	0...9999			300
2	DANFOSS ETS100	dE02	16756	RW	WORD	Stepper motor complete opening	0...9999			3530
2	DANFOSS ETS100	dE03	49554	RW	WORD	Stepper motor extra movement in total closure	0...255			160
2	DANFOSS ETS100	dE04	16804	RW	WORD	Maximum current stepper motor winding	-1999...9999			100
2	DANFOSS ETS100	dE05	49602	RW	BYTE	Stepper motor winding resistance	0...255			52
2	DANFOSS ETS100	dE06	16852	RW	WORD	Idle current stepper motor winding	0...9999			75
2	DANFOSS ETS100	dE07	49650	RW	BYTE	Type of stepper motor control	0...5			0
2	DANFOSS ETS100	dE08	50962	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
2	DANFOSS ETS100	dE09	50978	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
2	DANFOSS ETS100	dE80	50994	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
3	ALCO EX4-EX5-EX6	dE01	16726	RW	WORD	Stepper motor maximum speed	0...9999			500
3	ALCO EX4-EX5-EX6	dE02	16758	RW	WORD	Stepper motor complete opening	0...9999			750
3	ALCO EX4-EX5-EX6	dE03	49555	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
3	ALCO EX4-EX5-EX6	dE04	16806	RW	WORD	Maximum current stepper motor winding	-1999...9999			500
3	ALCO EX4-EX5-EX6	dE05	49603	RW	BYTE	Stepper motor winding resistance	0...255			13
3	ALCO EX4-EX5-EX6	dE06	16854	RW	WORD	Idle current stepper motor winding	0...9999			100
3	ALCO EX4-EX5-EX6	dE07	49651	RW	BYTE	Type of stepper motor control	0...5			0

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
3	ALCO EX4-EX5-EX6	dE08	50963	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
3	ALCO EX4-EX5-EX6	dE09	50979	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
3	ALCO EX4-EX5-EX6	dE80	50995	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
4	VALUE NOT USED	-	-	-	-	-	-	-	-	-
5	ALCO EX7	dE01	16730	RW	WORD	Stepper motor maximum speed	0...9999			210
5	ALCO EX7	dE02	16762	RW	WORD	Stepper motor complete opening	0...9999			1600
5	ALCO EX7	dE03	49557	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
5	ALCO EX7	dE04	16810	RW	WORD	Maximum current stepper motor winding	-1999...9999			750
5	ALCO EX7	dE05	49605	RW	BYTE	Stepper motor winding resistance	0...255			8
5	ALCO EX7	dE06	16858	RW	WORD	Idle current stepper motor winding	0...9999			250
5	ALCO EX7	dE07	49653	RW	BYTE	Type of stepper motor control	0...5			0
5	ALCO EX7	dE08	50965	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
5	ALCO EX7	dE09	50981	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
5	ALCO EX7	dE80	50997	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
6	ALCO EX8	dE01	16732	RW	WORD	Stepper motor maximum speed	0...9999			500
6	ALCO EX8	dE02	16764	RW	WORD	Stepper motor complete opening	0...9999			2600
6	ALCO EX8	dE03	49558	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
6	ALCO EX8	dE04	16812	RW	WORD	Maximum current stepper motor winding	-1999...9999			800
6	ALCO EX8	dE05	49606	RW	BYTE	Stepper motor winding resistance	0...255			6
6	ALCO EX8	dE06	16860	RW	WORD	Idle current stepper motor winding	0...9999			500
6	ALCO EX8	dE07	49654	RW	BYTE	Type of stepper motor control	0...5			0
6	ALCO EX8	dE08	50966	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
6	ALCO EX8	dE09	50982	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
6	ALCO EX8	dE80	50998	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE01	16734	RW	WORD	Stepper motor maximum speed	0...9999			45
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE02	16766	RW	WORD	Stepper motor complete opening	0...9999			480

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE03	49559	RW	BYTE	Stepper motor extra movement in total closure	0...255			70
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE04	16814	RW	WORD	Maximum current stepper motor winding	-1999...9999			450
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE05	49607	RW	BYTE	Stepper motor winding resistance	0...255			36
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE06	16862	RW	WORD	Stepper motor winding rated current	0...9999			100
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE07	49655	RW	BYTE	Type of stepper motor control	0...5			5
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE08	50967	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			30
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE09	50983	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			250
7	CAREL E2V-E3V-E4V E5V-E6V-E7V	dE80	50999	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
8	SPORLAN SER	dE01	16736	RW	WORD	Stepper motor maximum speed	0...9999			200
8	SPORLAN SER	dE02	16768	RW	WORD	Stepper motor complete opening	0...9999			1596
8	SPORLAN SER	dE03	49560	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
8	SPORLAN SER	dE04	16816	RW	WORD	Maximum current stepper motor winding	-1999...9999			120
8	SPORLAN SER	dE05	49608	RW	BYTE	Stepper motor winding resistance	0...255			100
8	SPORLAN SER	dE06	16864	RW	WORD	Idle current stepper motor winding	0...9999			50
8	SPORLAN SER	dE07	49656	RW	BYTE	Type of stepper motor control	0...5			0
8	SPORLAN SER	dE08	50968	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
8	SPORLAN SER	dE09	50984	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
8	SPORLAN SER	dE80	51000	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
9	SPORLAN SEI-30	dE01	16738	RW	WORD	Stepper motor maximum speed	0...9999			200
9	SPORLAN SEI-30	dE02	16770	RW	WORD	Stepper motor complete opening	0...9999			3193
9	SPORLAN SEI-30	dE03	49561	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
9	SPORLAN SEI-30	dE04	16818	RW	WORD	Maximum current stepper motor winding	-1999...9999			160
9	SPORLAN SEI-30	dE05	49609	RW	BYTE	Stepper motor winding resistance	0...255			75
9	SPORLAN SEI-30	dE06	16866	RW	WORD	Idle current stepper motor winding	0...9999			50

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
9	SPORLAN SEI-30	dE07	49657	RW	BYTE	Type of stepper motor control	0...5			0
9	SPORLAN SEI-30	dE08	50969	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
9	SPORLAN SEI-30	dE09	50985	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
9	SPORLAN SEI-30	dE80	51001	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
10	SPORLAN SEI-50 SEH*	dE01	16740	RW	WORD	Stepper motor maximum speed	0...9999			200
10	SPORLAN SEI-50 SEH*	dE02	16772	RW	WORD	Stepper motor complete opening	0...9999			6386
10	SPORLAN SEI-50 SEH*	dE03	49562	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
10	SPORLAN SEI-50 SEH*	dE04	16820	RW	WORD	Maximum current stepper motor winding	-1999...9999			160
10	SPORLAN SEI-50 SEH*	dE05	49610	RW	BYTE	Stepper motor winding resistance	0...255			75
10	SPORLAN SEI-50 SEH*	dE06	16868	RW	WORD	Idle current stepper motor winding	0...9999			50
10	SPORLAN SEI-50 SEH*	dE07	49658	RW	BYTE	Type of stepper motor control	0...5			0
10	SPORLAN SEI-50 SEH*	dE08	50970	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
10	SPORLAN SEI-50 SEH*	dE09	50986	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
10	SPORLAN SEI-50 SEH*	dE80	51002	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
11	VALUE NOT USED	-	-	-	-	-	-	-	-	-
12	SPORLAN SER(I) G, J, K, B, C, D	dE01	16744	RW	WORD	Stepper motor maximum speed	0 ... 9999			160
12	SPORLAN SER(I) G, J, K, B, C, D	dE02	16776	RW	WORD	Stepper motor complete opening	0...9999			2500
12	SPORLAN SER(I) G, J, K, B, C, D	dE03	49564	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
12	SPORLAN SER(I) G, J, K, B, C, D	dE04	16824	RW	WORD	Maximum current stepper motor winding	-1999...9999			120
12	SPORLAN SER(I) G, J, K, B, C, D	dE05	49612	RW	BYTE	Stepper motor winding resistance	0...255			100
12	SPORLAN SER(I) G, J, K, B, C, D	dE06	16872	RW	WORD	Idle current stepper motor winding	0...9999			50
12	SPORLAN SER(I) G, J, K, B, C, D	dE07	49660	RW	BYTE	Type of stepper motor control	0...5			0
12	SPORLAN SER(I) G, J, K, B, C, D	dE08	50972	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
12	SPORLAN SER(I) G, J, K, B, C, D	dE09	50988	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			255
12	SPORLAN SER(I) G, J, K, B, C, D	dE80	51004	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			12
13	ALCO EXM246 - EXL246	dE01	16746	RW	WORD	Stepper motor maximum speed	0...9999			45
13	ALCO EXM246 - EXL246	dE02	16778	RW	WORD	Stepper motor complete opening	0...9999			250
13	ALCO EXM246 - EXL246	dE03	49565	RW	BYTE	Stepper motor extra movement in total closure	0...255			100
13	ALCO EXM246 - EXL246	dE04	16826	RW	WORD	Stepper motor winding maximum current	-1999...9999			65
13	ALCO EXM246 - EXL246	dE05	49613	RW	BYTE	Stepper motor winding resistance	0...255			250
13	ALCO EXM246 - EXL246	dE06	16874	RW	WORD	Stepper motor winding rated current	0...9999			65
13	ALCO EXM246 - EXL246	dE07	49661	RW	BYTE	Type of stepper motor control	0...5			1
13	ALCO EXM246 - EXL246	dE08	50973	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
13	ALCO EXM246 - EXL246	dE09	50989	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
13	ALCO EXM246 - EXL246	dE80	51005	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
14	SANHUA DPF(Q) - DPF(T01)	dE01	16750	RW	WORD	Stepper motor maximum speed	0...9999			40
14	SANHUA DPF(Q) - DPF(T01)	dE02	16782	RW	WORD	Stepper motor complete opening	0...9999			250
14	SANHUA DPF(Q) - DPF(T01)	dE03	49567	RW	BYTE	Stepper motor extra movement in total closure	0...255			50
14	SANHUA DPF(Q) - DPF(T01)	dE04	16830	RW	WORD	Stepper motor winding maximum current	-1999...9999			105
14	SANHUA DPF(Q) - DPF(T01)	dE05	49615	RW	BYTE	Stepper motor winding resistance	0...255			92
14	SANHUA DPF(Q) - DPF(T01)	dE06	16878	RW	WORD	Stepper motor winding rated current	0...9999			35
14	SANHUA DPF(Q) - DPF(T01)	dE07	49663	RW	BYTE	Type of stepper motor control	0...5			1

dE00	VALVE	LABEL	PAR. ADDR	R/W	DATA SIZE	DESCRIPTION	RANGE	CPL	EXP	Default
14	SANHUA DPF(Q) - DPF(T01)	dE08	50975	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
14	SANHUA DPF(Q) - DPF(T01)	dE09	50991	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
14	SANHUA DPF(Q) - DPF(T01)	dE80	51007	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10
15	ELIWELL SXVB by CASTEL	dE01	16750	RW	WORD	Stepper motor maximum speed	0...9999			20
15	ELIWELL SXVB by CASTEL	dE02	16782	RW	WORD	Stepper motor complete opening	0...9999			195
15	ELIWELL SXVB by CASTEL	dE03	49567	RW	BYTE	Stepper motor extra movement in total closure	0...255			60
15	ELIWELL SXVB by CASTEL	dE04	16830	RW	WORD	Maximum current stepper motor winding	-1999...9999			-200
15	ELIWELL SXVB by CASTEL	dE05	49615	RW	BYTE	Stepper motor winding resistance	0...255			54
15	ELIWELL SXVB by CASTEL	dE06	16878	RW	WORD	Idle current stepper motor winding	0...9999			50
15	ELIWELL SXVB by CASTEL	dE07	49663	RW	BYTE	Type of stepper motor control	0...5			0
15	ELIWELL SXVB by CASTEL	dE08	50975	RW	BYTE	Stepper motor enabling/ disabling duty cycle	0...100			100
15	ELIWELL SXVB by CASTEL	dE09	50991	RW	BYTE	Stepper motor acceleration/ deceleration	0...255			50
15	ELIWELL SXVB by CASTEL	dE80	51007	RW	BYTE	Minimum stepper motor speed in acceleration/deceleration	0...255			10

Tab. 38 Valve configuration parameters dE01...dE09, dE80 con dE ≠0

9.2.5 - Folder visibility table

LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	Default
rE	49424	RW	Folder Visibility	2 bit	0...3			3
Ai	49424.2	RW	Folder Visibility	2 bit	0...3			3
di	49424.4	RW	Folder Visibility	2 bit	0...3			3
dO	49424.6	RW	Folder Visibility	2 bit	0...3			3
SP	49425	RW	Folder Visibility	2 bit	0...3			3
PAr	49425.2	RW	Folder Visibility	2 bit	0...3			3
FnC	49425.4	RW	Folder Visibility	2 bit	0...3			3
PASS	49425.6	RW	Folder Visibility	2 bit	0...3			3
SP1	49426.2	RW	Folder Visibility	2 bit	0...3			3
SP2	49426.4	RW	Folder Visibility	2 bit	0...3			3
SP3	49426.6	RW	Folder Visibility	2 bit	0...3			3
SP4	49427	RW	Folder Visibility	2 bit	0...3			3
dF	49427.4	RW	Folder Visibility	2 bit	0...3			3
dF43	49449	RW	Folder Visibility	2 bit	0...3			3
dF44	49449.2	RW	Folder Visibility	2 bit	0...3			3
dL	49427.2	RW	Folder Visibility	2 bit	0...3			3
dE	49427.6	RW	Folder Visibility	2 bit	0...3			3
UI	49428	RW	Folder Visibility	2 bit	0...3			3
CC	49428.2	RW	Folder Visibility	2 bit	0...3			3
UL	49459.2	RW	Folder Visibility	2 bit	0...3			3
DL	49459.4	RW	Folder Visibility	2 bit	0...3			3
FR	49459.6	RW	Folder Visibility	2 bit	0...3			3

Tab. 39 Display folder (Folder)

9.2.6 - Client Table

INDEX	FOLDER	LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	M.U.
1	Ai	dAi1	563	R	Analog Input 1 (view)	WORD	-500...9999	Y	-1	°C/°F/ bar/PSI
2	Ai	dAi2	565	R	Analog Input 2 (view)	WORD	-500...9999	Y	-1	°C/°F/ bar/PSI
5	Ai	dAi3	567	R	Analog Input 3 (view)	WORD	-500...9999	Y	-1	°C/°F
6	Ai	dAi4	569	R	Analog Input 4 (view)	WORD	-500...9999	Y	-1	°C/°F
7	Ai	drE1	432	R	valve overheating temperature EEVD	WORD	-500...9999	Y	-1	°C/°F
8	Ai	drE2	434	R	Valve saturation temperature EEVD	WORD	-500...9999	Y	-1	°C/°F
9	Ai	drE3	436	R	Valve overheating temperature EEVD (backup)	WORD	-500...9999	Y	-1	°C/°F
10	Ai	drE4	438	R	Valve saturation temperature EEVD (backup)	WORD	-500...9999	Y	-1	°C/°F
11	Ai	drE5	446	R	Valve overheating EEVD	WORD	-500...9999	Y	-1	K/°R
12	Ai	drE6	448	R	valve evaporator pressure EEVD	WORD	-500...9999	Y	-1	bar/PSI
13	Ai	drE7	450	R	valve opening percentage EEVD	WORD	-500...9999		-1	%
14	Ai	SP4	519	R	valve overheating setpoint EEVD	WORD	-500...9999	Y	-1	K/°R
29	Ai	evaporatorPress	525	RW	valve evaporator pressure from remote (shared probe)	WORD	-500...9999	Y	-1	PSI
30	Ai	evaporatorTemp	527	RW	valve saturation temperature from remote (shared probe)	WORD	-500...9999	Y	-1	°F
31	Di	ddi1	33062	R	Digital input 1	1 bit	0...1			flag
32	Di	ddi2	33062.1	R	Digital input 2	1 bit	0...1			flag
33	Di	Dip1	33058.1	R	DIP switch 1 status	1 bit	0...1			flag
34	Di	Dip2	33058.2	R	DIP switch 2 status	1 bit	0...1			flag
35	Di	Dip3	33058.3	R	DIP switch 3 status	1 bit	0...1			flag
36	Di	Dip4	33058.4	R	DIP switch 4 status	1 bit	0...1			flag
37	Di	Dip5	33058.5	R	DIP switch 5 status	1 bit	0...1			flag
38	Di	Dip6	33058.6	R	DIP switch 6 status	1 bit	0...1			flag
39	dO	ddO1	33063.6	R	Digital output ddO1	1 bit	0...1			flag
40	dO	ddO2	33063.5	R	Digital output ddO2	1 bit	0...1			flag
41	Alarm	Er01	33052.1	R	Probe error dAi1	1 bit	0...1			flag
42	Alarm	Er02	33052.2	R	Probe error dAi2	1 bit	0...1			flag
43	Alarm	Er03	33052.3	R	Probe error dAi3	1 bit	0...1			flag
44	Alarm	Er04	33052.4	R	Probe error dAi4	1 bit	0...1			flag
45	Alarm	Er05	33052.5	R	Valve overheating probe alarm EEVD	1 bit	0...1			flag
46	Alarm	Er06	33052.6	R	Valve saturation probe alarm EEVD	1 bit	0...1			flag
47	Alarm	Er07	33052.7	R	Valve MOP alarm EEVD	1 bit	0...1			flag

INDEX	FOLDER	LABEL	PAR. ADDR	R/W	DESCRIPTION	DATA SIZE	RANGE	CPL	EXP	M.U.
48	Alarm	Er08	33053	R	Valve output max alarm EEVD	1 bit	0...1			flag
49	Alarm	Er09	33053.1	R	Valve external alarm EEVD	1 bit	0...1			flag
50	Alarm	Er10	33053.2	R	Valve no-link alarm EEVD	1 bit	0...1			flag
51	Alarm	Er11	33053.3	R	Valve motor alarm EEVD: high current absorption	1 bit	0...1			flag
52	Alarm	Er12	33053.4	R	Valve motor alarm EEVD: winder 1 not connected	1 bit	0...1			flag
53	Alarm	Er13	33053.5	R	Valve motor alarm EEVD: winder 1 in short circuit	1 bit	0...1			flag
54	Alarm	Er14	33053.6	R	Valve motor alarm EEVD: winder 2 not connected	1 bit	0...1			flag
55	Alarm	Er15	33053.7	R	Valve motor alarm EEVD: winder 2 in short circuit	1 bit	0...1			flag
56	State	EEV_STTS_ON	33257	R	Enable EEVD valve control	1 bit	0...1			flag
57	State	EEV_STTS_ALM	33257.1	R	EEVD alarm	1 bit	0...1			flag
58	State	EEV_STTS_DEFR	33257.2	R	EEVD defrost	1 bit	0...1			flag
59	State	EEV_STTS_NOLINK	33257.3	R	control status in no-link	1 bit	0...1			flag
60	State	EEV_STTS_MOD	33257.4	R	Select function modes	2 bit	0...3			num
61	State	EEV_STTS_SPECIAL_ON	33257.6	R	Opening state of fixed valve before EEVD closure	1 bit	0...1			num
62	State	EEV_STTS_FORCE_OPEN	33257.7	R	Forced complete EEVC valve opening state	1 bit	0...1			num
63	Net Command	EEV_STTS_ON_SET	33259	W	Valve control ON	1 bit	0...1			flag
64	Net Command	EEV_STTS_ALM_SET	33259.1	W	Alarm status ON	1 bit	0...1			flag
65	Net Command	EEV_STTS_DEFR_SET	33259.2	W	Defrost status ON	1 bit	0...1			flag
66	Net Command	EEV_STTS_SPECIAL_ON_SET	33259.6	W	Valve opening command FIX ON	1 bit	0...1			flag
67	Net Command	EEV_STTS_FORCE_OPEN_SET	33259.7	W	Valve opening command 100% ON	1 bit	0...1			flag
68	Net Command	EEV_STTS_MOD_SET	33259.4	W	Selection command operating mode 0: 00 → command 1 1: 01 → command 2 2: 10 → command 3 3: 11 → command 4	2 bit	0...3			num
72	Net Command	EEV_STTS_ON_RESET	33259	W	Valve control OFF	1 bit	0...1			flag
73	Net Command	EEV_STTS_ALM_RESET	33259.1	W	Alarm status OFF	1 bit	0...1			flag
74	Net Command	EEV_STTS_DEFR_RESET	33259.2	W	Defrost status OFF	1 bit	0...1			flag
75	Net Command	EEV_STTS_SPECIAL_ON_ RESET	33259.6	W	Valve opening command FIX OFF	1 bit	0...1			flag
76	Net Command	EEV_STTS_FORCE_OPEN_ RESET	33259.7	W	Valve opening command 100% OFF	1 bit	0...1			flag

Tab. 40 Client

10 - ALARMS

The Driver can run full diagnostics on installation, signalling any operating errors with specific alarms found, and record and signal any user-defined unusual events to have greater control over the installation as a whole.

The alarm condition is always reported by the LED near the alarm icon and the enabling of the output on the relay, if appropriately configured.

10.1 - Alarms table

Label	Description/Cause (default settings)	Effect	Reset	Solution
Er01	**dAi1 probe error** • Measured values are outside the nominal range. • Control probe inoperable/short-circuited/ open.	• Only reported if the relative backup probe dAi2 is configured • Otherwise see Er06.	A	• Check the probe wiring. • Replace probe. • When error has been removed, regulation continues as normal.
Er02	**dAi2 probe error** Same as Er01.	Same as Er01 (probe dAi1).	A	Same as Er01.
Er03	**dAi3 probe error** Same as Er01.	• Only reported if the relative backup probe Ai4 is configured. • Otherwise see Er05.	A	Same as Er01.
Er04	**dAi4 probe error** Same as Er01.	Same as Er01 (probe dAi3).	A	Same as Er01.
Er05	**Evaporator output probe error.** Both probes Ai3 Ai4 are inoperable.	% valve opening =dE16.	A	Same as Er01.
Er06	**Saturation output error.** Both probes Ai1, Ai2 are inoperable.	• Example dE50 = 0 % valve opening = dE16. • Example dE50 = 1 Valve closed.	A	Same as Er01.
Er07	**MOP alarm.** Saturation temperature > MOP setpoint (dE52) for longer than dE53.	Only if dE50 = 1. Valve closed.	A	Wait for saturation temperature to return < dE52.
Er08	% maximum valve opening drE7 ≥ dE10 for longer than dE13.	Report only.	A	Wait for return % of maximum valve opening drE7 < dE10.
Er09	**External alarm.** Activation of digital input configured as external alarm. See parameters dL40/dL41=±3.	Valve closed.	A	Deactivation of digital input configured as external alarm.
Er10	**NO link alarm.** Serial communication unsuccessful (dF02 = 1, 2)	Valve closed.	A	Restore communication.
Er11	**Motor protection alarm.** Excessive current absorption.	Valve closed.	A	• Check motor phases. • Check motor connection.
Er12	**Motor protection alarm.** Winder 1 disconnected.	Valve closed.	A	• Check winder 1 connection (terminals 6-7). • Check correct parameter settings dE01...dE09, dE80.
Er13	**Motor protection alarm.** Winder 1 short circuit.	Valve closed.	A	Same as Er12.
Er14	**Motor protection alarm.** Winder 2 disconnected.	Valve closed.	A	• Check winder 2 connection (terminals 4-5). • Check correct parameter settings dE01...dE09, dE80.
Er15	**Motor protection alarm.** Winder 2 short circuit.	Valve closed.	A	Same as Er14.

Tab. 41 Alarms

11 - SUPERVISION

The serial TTL - also called COM0 – can be used to configure the device, parameters, states, and variables with Modbus via the Modbus protocol.

11.1 - Configuration with Modbus RTU

Modbus is a client/server protocol for communication between devices connected in a network.

Modbus devices communicate using a master-slave technique in which only one device (master) can send messages. The other devices in the network (slave) respond, returning the data requested by the master or executing the action contained in the message sent. A slave is a device connected to a network that processes information and sends the results to the master using the Modbus protocol.

The master device can send messages to individual slaves or to the entire network (broadcast) whilst slaves can only respond individually to the master.

The Modbus standard used by Hussmann employs the RTU code for data transmission.

11.2 - Data format (RTU)

The coding model used defines the structure of messages transmitted on the network and the way in which this information is deciphered. The coding type is usually chosen according to specific parameters (baud rate, parity, etc.)*. Some devices also support only certain coding models. However this must be the same for all devices connected to a modbus network.

The protocol uses the RTU binary method with bytes configured as follows:

- 8 bit for data, even parity bit (not configurable), 1 stop bit.

* Can be set via parameters **dF30**, **dF31**.

Parameter setting allows the full configuration of the device.

sending data via Modbus protocol directly to an individual controller or broadcasting it using the address 0.

Refer to **(Fig. 20)** and **(Fig. 21)** for the connection diagram for use with modbus.

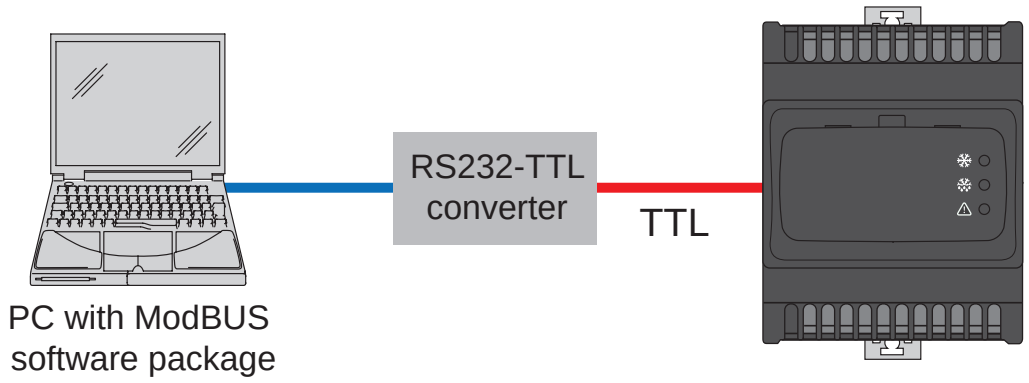


Fig. 20 ModBus connection to individual devices via TTL

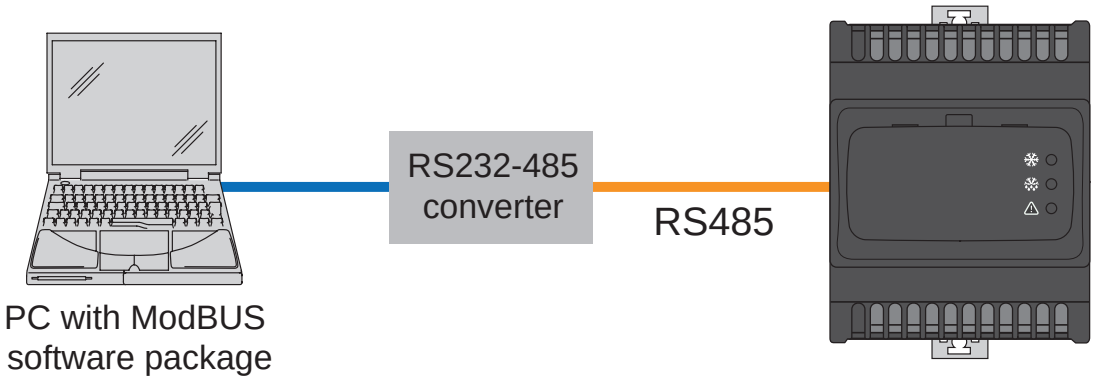


Fig. 21 ModBus connection to multiple devices via RS485

PC connection / Interface	RS232 cable
Device / TTL Interface connection	5-wire TTL cable (30cm) in length (other measurements/lengths available)
Device / RS485 Interface connection	RS485 cabled, screened and twisted (e.g.: Belden cable reference 8762)

Tab. 44 Connection for use with modbus

Modbus commands available and data areas

Modbus command	Description of command	
3	Read multiple registers on Client side	
16	Write multiple registers on Client side	
43	0	Manufacturer ID
	1	Reference ID
	2	Instrument ID

Tab. 45 Modbus commands available and data areas

Maximum length in bytes of messages sent to device	60 BYTES
Maximum length in bytes of messages received from the device	60 BYTES

Tab. 46 Length restrictions

11.3 - Configuration of device address

The address of a device (Device Number) in a ModBus message is defined in parameter dF30.

Refer to **“9 - PARAMETERS (PAr)”**.

The address 0 is used for broadcast messages that all slaves recognize. Slaves don’t respond to broadcast messages.

11.4 - Configuration of parameter addresses

For the list of addresses, refer to **“9.2.1 - Parameter table / visibility”**.

11.5 - Configuration of variable addresses / states

For the list of addresses, refer to **“9.2.6 - Client Table”.**